

Report on the investigation of
the grounding of the sail training vessel

TS Royalist

near Chapman's Pool
off the south coast of the United Kingdom

5 April 2009

Marine Accident Investigation Branch
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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.

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GLOSSARY OF ABBREVIATIONS, ACRONYMS AND TERMS

AIS	-	Automatic Identification System
ASTO	-	Association of Sail Training Organisations
GPS	-	Global Positioning System
ICS	-	International Chamber of Shipping
IMO	-	International Maritime Organization
IRF	-	Incident Report Form
ISM	-	International Safety Management
kW	-	Kilowatt
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MSN	-	Merchant Shipping Notice
MSSC	-	The Marine Society & Sea Cadets
RNLI	-	Royal National Lifeboat Institution
RYA	-	Royal Yachting Association
SMS	-	Safety Management System
SOLAS	-	International Convention for the Safety of Life at Sea
TARS	-	Naval Cadet Forces Training Afloat Regulations and Safety
UK	-	United Kingdom
UTC	-	Universal Co-ordinated Time

Brace	-	A rope attached to the yard of a ship for trimming the sail
To brace	-	To bring the yard arms to either side by means of the braces
Brig	-	A two-masted square-rigged ship with an additional fore-and-aft sail on the mainmast
Cable	-	0.1 nautical mile
Furl	-	To roll up a sail and wrap it about a yard, mast or stay
Gasket	-	A cord by which the sails, when furled, are bound close to the yard
Kedge anchor	-	A small anchor used with a light line to move a ship
Knockdown	-	The heeling of a sailing ship by a sudden force of wind to a steady angle of greater than 45°

Times: All times used in this report are UTC +1 unless otherwise stated.



TS Royalist

SYNOPSIS



At about 1120 on 5 April 2009, the square-rigged sail training vessel, TS *Royalist*, ran aground while leaving Chapman's Pool off the south coast of the UK. There were no resulting injuries to the 32 people on board, which included 23 sea cadets, and the vessel sustained no damage.

While navigating and steering the vessel under power, the master became distracted by monitoring the setting of sails and inadvertently allowed the vessel to deviate from her intended track into shallow waters. The vessel's watertight doors were closed

following the grounding and an inspection of the internal compartments confirmed no resulting ingress of water. TS *Royalist* was refloated with the help of Weymouth RNLi lifeboat, and she was then able to return to her home port of Gosport without further assistance.

The master, although a qualified yachtmaster, was not a professional mariner, but served as a relief master for one or two weeks per year. He had not had any assessment of his performance as master at sea during the 3 years leading up to the accident. He had joined TS *Royalist* on the previous day. He had developed a low perception of risk after navigating yachts to and from Chapman's Pool, and became complacent. He did not recognise the need for additional caution in view of the fact that TS *Royalist* was a larger and more demanding vessel than the yachts he had previously navigated; he was over-confident that his level of planning and monitoring would suffice. He did not plot his intended track, or employ anyone to navigate, take the helm or act as lookout. In deciding to set sail while continuing to navigate, look out and steer the vessel himself, he became distracted. With no other crew members in place to monitor his actions, his error in deviating from the intended track went undetected and unaddressed, resulting in the grounding. A recommendation has been made to the Marine Society & Sea Cadets (MSSC) for it to develop a structured system for the selection and audit of relief masters.

Although there was no statutory requirement for TS *Royalist* to be operated under a formal safety management system, MSSC did provide a suite of safety management procedures for its fleet. However, with respect to cockpit manning and navigational practices, these procedures were insufficient to prevent the accident.

Subsequent to the accident, the MSSC has made extensive changes designed to improve navigational procedures on board its vessels. Additionally, the Maritime and Coastguard Agency (MCA) and the Association of Sail Training Organisations (ASTO) have agreed to set up a working group to consider the management of safety and establish best practice guidelines for the UK sail training industry.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF TS *ROYALIST* AND ACCIDENT

Vessel details

Registered owner	:	The Marine Society & Sea Cadets
Manager	:	Sea Cadets Offshore Office
Port of registry	:	Portsmouth
Flag	:	UK
Type	:	Brig – sail training vessel
Built	:	1971, Isle of Wight
Construction	:	Steel
Length overall	:	29.56m (including after davits and bowsprit)
Length of hull	:	23.32m
Gross tonnage	:	83.09
Engine power and/or type	:	2 Perkins diesel engines each producing 101kW
Other relevant info	:	Twin screw

Accident details

Time and date	:	1120, 5 April 2009
Location of incident	:	Latitude 50° 35'.29 N and Longitude 002° 04'.78 W, 1.1 nautical miles NW of St Alban's Head, Dorset
Persons on board	:	32
Injuries/fatalities	:	None
Damage	:	None

1.2 NARRATIVE

On the afternoon of 4 April 2009, 23 sea cadets and 2 adult watch officers joined TS *Royalist*, which was berthed at Fort Blockhouse, Gosport. The master also joined the vessel that afternoon; he was a relief master and was standing in for the permanent master, who was on leave. The other permanent staff and an additional trainee engineer were already on board preparing the vessel.

The sailing master briefed the master on the status of the vessel, and showed him an electronic chart plotter that had been fitted since the master was last on board. Although he was familiar with the operation of chart plotters, the master consulted the operations manual, and the engineer showed him a number of functions on the chart plotter's control panel.

The permanent staff were occupied with the joining routine, such as checking consent forms, allocating bunks, organising watches and giving safety briefs, including what action the cadets should take on hearing the emergency signal.

The master and the sailing master discussed a basic passage plan and the predicted weather and tides for the week's voyage ahead, which was to end at Brixham. A documented passage plan was not prepared; however the master entered a number of waypoints into the chart plotter for the forthcoming voyage and drew course lines on the paper charts (**Figure 1**). When all preparations had been made, TS *Royalist* let go at 1900 and proceeded, under power, to Cowes, where she berthed for the night.

At 0700 on 5 April 2009, the vessel let go and, because there was little wind, she made her way through the western Solent under power. The master intended to berth at Weymouth that evening. Once TS *Royalist* had passed The Needles, the cadets were shown their bracing stations and were taken through a manoverboard exercise, during which the vessel's tender was launched and recovered.

In light wind conditions, with little opportunity to sail, it was normal practice to explore the various bays between St Alban's Head and Weymouth under power.

Later that morning, as TS *Royalist* was approaching St Alban's Head, some of the cadets were sent aloft for the first time at sea to release the gaskets in preparation for setting sails later.

The master had decided that, because the vessel was making good time, he would visit Chapman's Pool (**Figure 2**) before resuming passage to Worbarrow Bay, where he intended to anchor for lunch. At this time, the trainee engineer was at the helm. The master used the echo sounder and one of the radar's variable range rings to keep a minimum distance off the land as the vessel rounded St Alban's Head. He then took the helm and steered a northerly course towards Chapman's Pool.

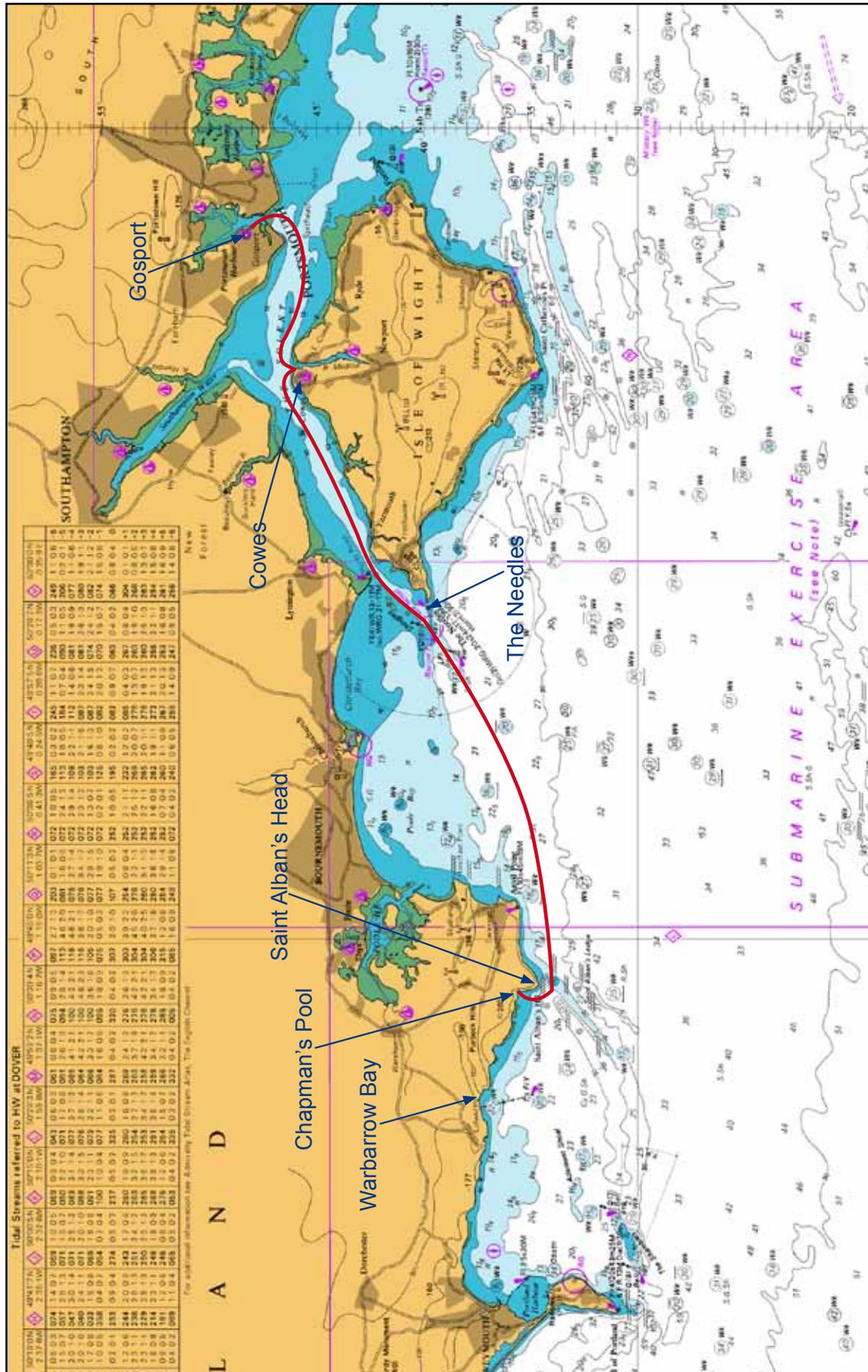
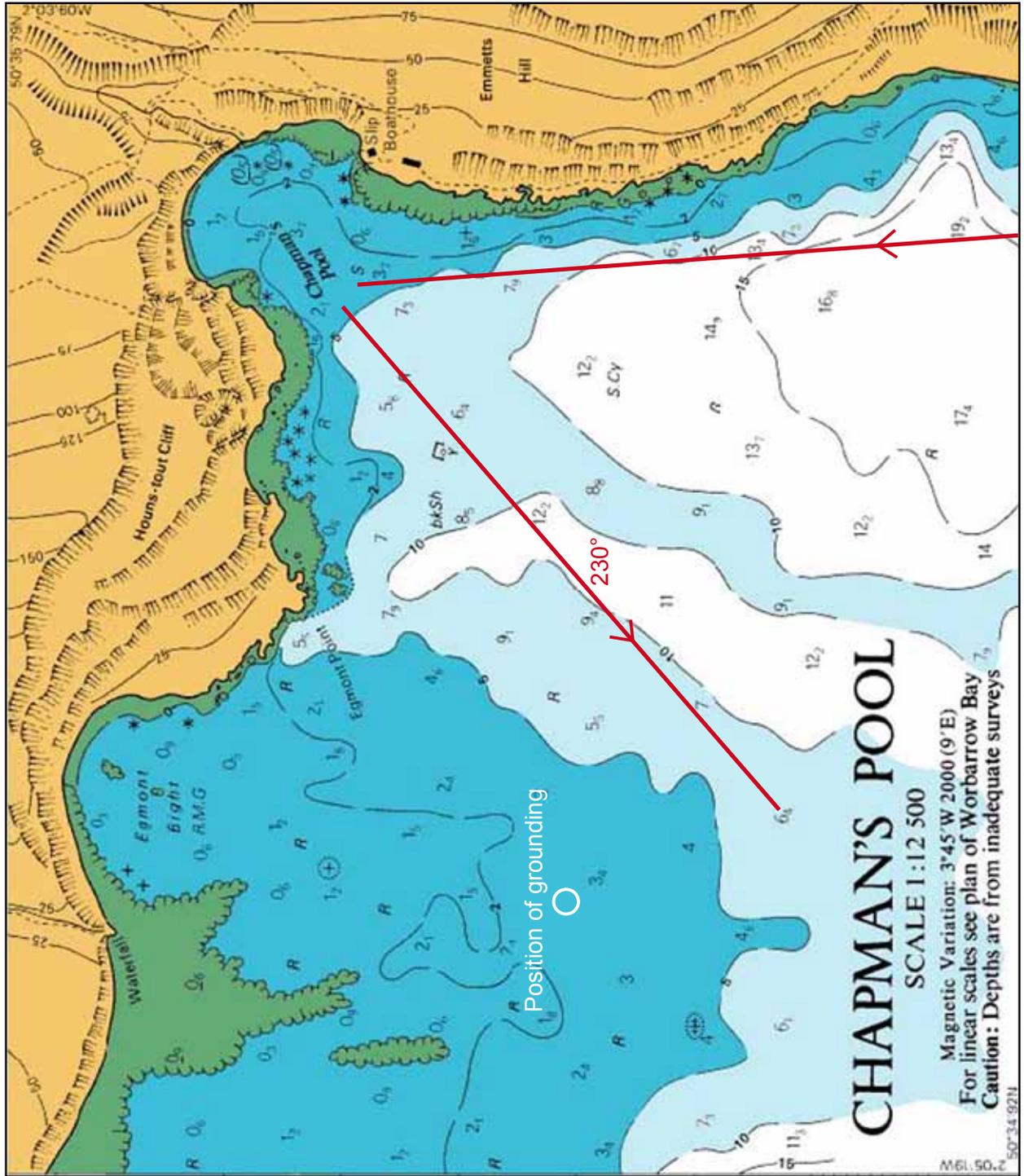


Figure 2



Basic interpretation of intended track to and from Chapman's pool and position of grounding

On reaching the entrance to Chapman's Pool, the master gave various engine movement instructions to the engineer, who was operating the throttles beside him, and turned the vessel around. At about this time, the coxswain came up from below and entered the cockpit. The master then steered a compass course of 230°, which he had determined from the paper chart to be an appropriate heading to clear the shallow water to the west. He had not entered a corresponding waypoint on the chart plotter and, therefore, had no visual course line to follow or monitor the vessel's progress.

Shortly afterwards, noting that the wind had increased from the east, the master instructed the sailing master to start setting sails. The first sails to be set were the fore topsail, under the supervision of the bosun, and the main topsail, under the supervision of the sailing master (**Figure 3**). All cadets were on deck and, as this was the first time they had carried out this task, the master felt it appropriate that he should monitor the activity.

At 1120, the vessel grounded in a position approximately 2 cables to the north-west of the master's intended track. The master ordered the engines to be stopped and the sails to be furled.

The emergency signal was sounded and the permanent staff instructed the cadets to don their lifejackets and to muster on the port side of the deck (**Figure 4**). They closed the vessel's watertight doors and checked all internal compartments for any ingress of water; none was found.

The master made a brief attempt to refloat the vessel using astern power; however, the vessel remained fast aground. It was an hour before low water, with 0.1m of tide still to fall. On the master's instruction, the coxswain launched the tender, and stood by off the vessel.

The master called Portland Coastguard and reported that TS *Royalist* was aground, that he was assessing the situation and that he did not require any assistance at that time.

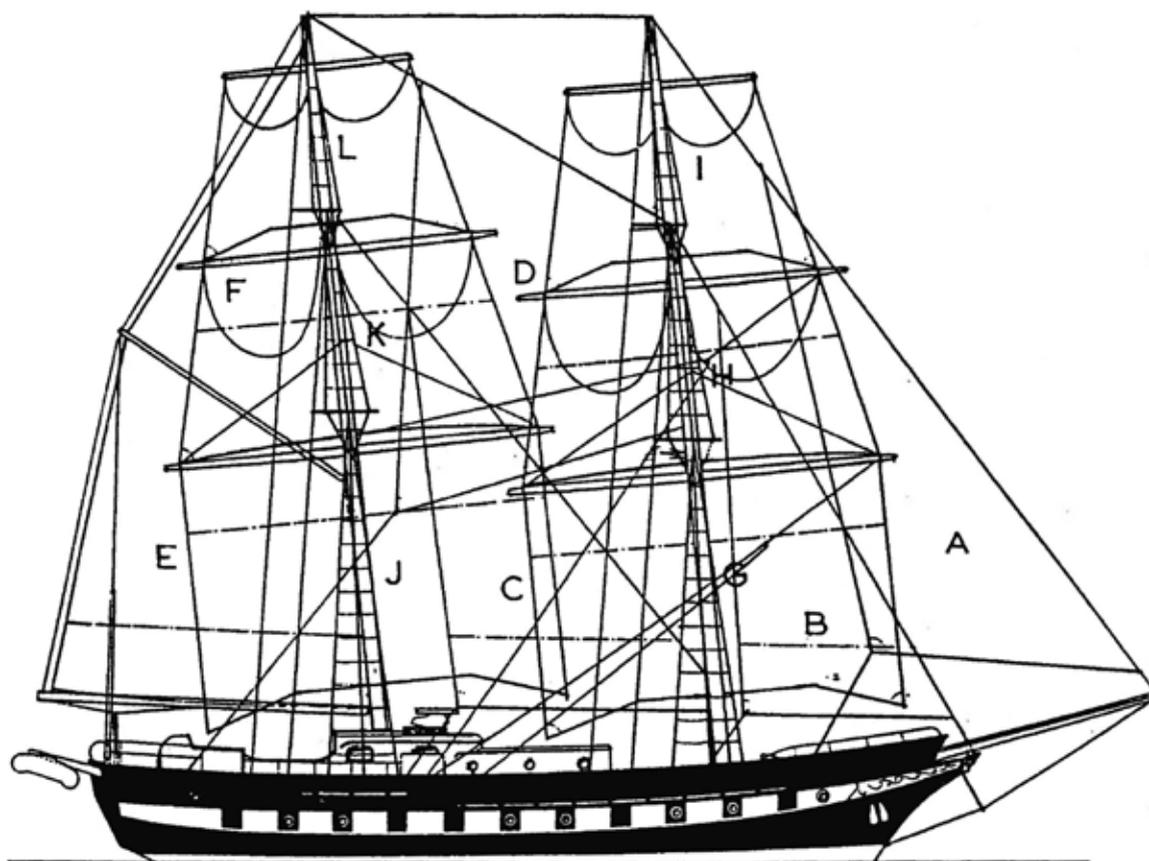
A small fishing vessel, *Flying Cloud*, was in close proximity and offered assistance. A towline was passed to her and a number of unsuccessful attempts were made to tow TS *Royalist* into deeper water.

The master then decided to deploy the kedge anchor to ensure TS *Royalist* did not move into more shallow water. The tender took the anchor and streamed the anchor line windward towards St Alban's Head.

Meanwhile, Weymouth RNLI lifeboat had been on exercise in the area and had heard the communications between Portland Coastguard and TS *Royalist*. The lifeboat contacted Portland Coastguard and agreed to proceed towards the casualty. Coastal rescue teams were assigned by the coastguard to observe the grounded vessel from the cliffs.

T.S. ROYALIST

SAIL PLAN



SCHEDULE OF SAILS

SAIL	Area sq.m.
- GENOA JIB.....	81.3
A. JIB.....	40.0
B. FORE STAYSAIL.....	28.8
C. MAIN STAYSAIL.....	33.4
D. MAIN TOPGALLANT STAYSAIL.....	15.3
E. SPANKER.....	54.3
F. SPANKER TOPSAIL.....	29.3
G. FORE COURSE.....	54.8
H. FORE TOPSAIL.....	37.1
I. FORE TOPGALLANT.....	26.9
J. MAIN COURSE.....	59.0
K. MAIN TOPSAIL.....	37.1
L. MAIN TOPGALLANT.....	23.2



TS *Royalist* aground off Chapman's Pool

The lifeboat arrived on scene at about 1220 and, having assessed the situation with the master, the lifeboat coxswain decided that he would make an attempt to tow the vessel into deeper water.

Flying Cloud passed the lifeboat's towline to TS *Royalist's* port bow, and the kedge anchor line was released and buoyed. In accordance with the advice provided by the lifeboat crew, the cadets were sent below before the lifeboat put weight on the towline. TS *Royalist* refloated at 1252 (**Figure 5**). The permanent staff checked all internal compartments again, and tested the engines and the steering; all were found satisfactory.

After the kedge anchor and the towline had been retrieved, TS *Royalist* returned under power to Gosport. Before starting the return voyage, the master reported the accident to the acting Offshore Commander.

TS *Royalist* arrived at Gosport at 1915. She was lifted out of the water and, on inspection, no grounding damage, except some minor scrapes to the vessel's anti-fouling, was found (**Figures 6 and 7**). The vessel resumed her schedule the following morning.



TS *Royalist* being towed by Weymouth RNLI lifeboat



TS *Royalist* in the lifting cradle for hull inspection after the grounding



Minor scrapes to the anti-fouling of TS *Royalist*

1.3 ENVIRONMENTAL CONDITIONS

In the area of the grounding there were clear skies, good visibility and a gentle breeze of between 7 and 10 knots. The sea state was calm with no swell.

Tides were on neaps and low water was estimated to be at 1220 in the vicinity of Chapman's Pool.

1.4 THE MARINE SOCIETY & SEA CADETS

1.4.1 Background

The Marine Society & Sea Cadets (MSSC) is a charity which was formed in 2004 following a merger of The Marine Society and the Sea Cadet Corps. The Marine Society has provided guidance, learning opportunities and support for professional seafarers from all the sea services for several hundreds of years. The Sea Cadet Corps is the UK's longest enduring charity, with about 400 units throughout the UK and about 15,000 young people engaged in learning nautical and life skills.

1.4.2 Sea Cadets Offshore Office

The Offshore Commander is the head of the Sea Cadets Offshore Office based in Fort Blockhouse, Gosport. He is responsible for the operational readiness, usage and safety of four of MSSC's training vessels, including TS *Royalist*. He has authority over MSSC permanent and relief offshore staff and spends occasional time at sea to monitor staff performance.

1.4.3 Safety management system

MSSC's Safety, Health and Environmental Protection Policy is reproduced at **Annex A**. The following paragraph is particularly relevant in this case:

“The MSSC shall take action to minimise risk and prevent injury, ill-health, loss incidents and damage to property and ensure that reasonably practicable measures are implemented, controlled and monitored. The MSSC will carry out processes of training, inspection, checks, audits, analysis, investigation and monitoring for the purpose of implementing corrective and preventive action.”

In exercising the above policy, MSSC sought to comply with the Naval Cadet Forces Training Afloat Regulations and Safety (TARS) (**Annex B**). These mandatory regulations apply to all training conducted afloat by the Naval Cadet Forces which comprise the Royal Naval element of the Combined Cadet Force, the Sea Cadets, the Volunteer Cadet Corps and sections of the Sea Scout movement that have been recognised by the Royal Navy. TARS provides direction on safety relating to a variety of waterborne activities, ranging from dinghy sailing to offshore operations. It also provides guidance on how the regulations should be applied in practice.

Supplementary instructions are provided by the Offshore Sea Cadets Office in the form of an Offshore Commander's Directive. The version of the Directive that was current at the time of the accident is reproduced at **Annex C**.

1.5 TS ROYALIST

1.5.1 The vessel

TS *Royalist* was built specifically as a sail training vessel for young cadets.

Merchant Shipping Notice (MSN) 1802 Certificates of Competency: Yacht Deck Officers Training and Certification Guidance – Part A7 defines a training vessel as follows:

“A training vessel, which may be either a sailing or motor vessel, means a vessel which is operated to provide:

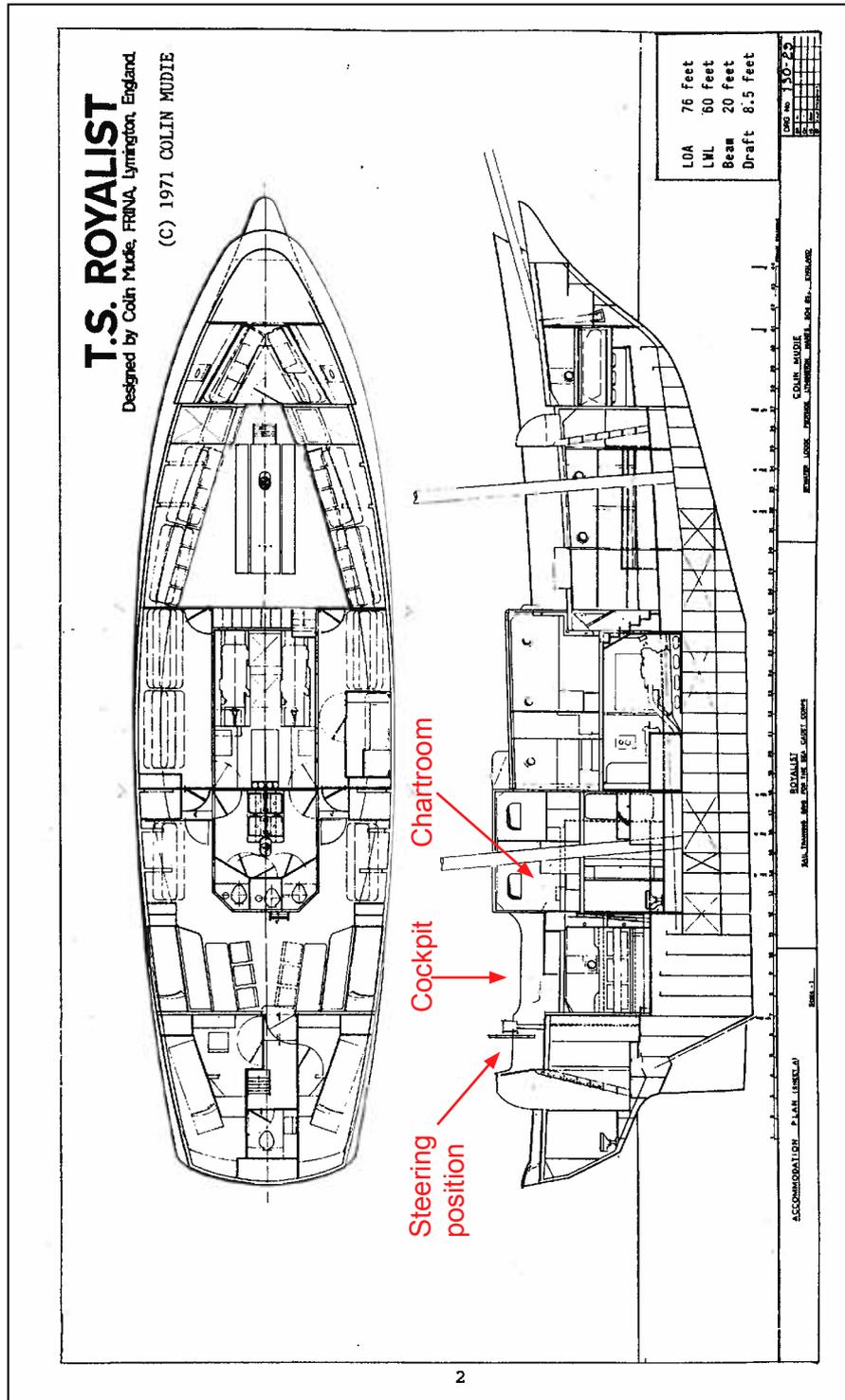
- a. Instruction in the principles of responsibility, resourcefulness, loyalty, and team endeavour and/or*
- b. Instruction in navigation and seamanship, marine engineering or other shipboard related skills.”*

TS *Royalist* was designed with a shallow draught of approximately 3m and limited mast height to maximise the number of ports she would be able to enter. The vessel was self-righting in the event of a knockdown.

The vessel had a brig rig, and was designed so that sail areas and rigging loads would be manageable by cadets.

The deck layout was traditional in that she had a deckhouse and an enclosed open-topped cockpit. There were two companionways leading from the cockpit into the deckhouse; the starboard companionway led forward past the galley and down into the accommodation below; the port companionway accessed the small chart room in which all the navigational aids and radio equipment were situated. The wheel, standard magnetic compass, and engine controls were located in the enclosed cockpit and a relative wind direction indicator was sited in front of the helm position (Figures 8 and 9).

Figure 8



Accommodation Plan of TS Royalist



View of chart room from the helm position

The vessel was extensively refurbished in 1992 with the aim of extending her life for a further 20 years.

1.5.2 Voyages

TS *Royalist's* annual operating season ran from the beginning of March to the end of November. From March to May, voyages were centred around Gosport and along the south coast of England. During mid-summer, the vessel moved north to Scotland and, thereafter, returned south, and was again based in Gosport until the end of the season. The vessel had taken part in regattas and tall ship races, which occasionally took her to foreign ports in north-west Europe.

Each voyage ran weekly from Saturday to Friday. When not utilised for sea cadet training, the vessel was used to give sailing experience to adults associated with MSSC.

1.5.3 Certification

TS *Royalist* held a valid Small Commercial Vessel Certificate for unrestricted operation issued by Lloyd's Register under the authority of the MCA. The vessel had been examined and found to be in accordance with the requirements of the Code of Practice for the Construction, Machinery, Equipment, Stability, Operation and Examination of Sailing vessels up to 24 metres Load Line length, in commercial use and which do not carry cargo or more than 12 passengers (The Blue Code).

Section 27.3 of The Blue Code provides for sail training vessels to be certified in accordance with The Blue Code as an alternative to operating under the conditions of a Load Line or Load Line Exemption certificate.

Although certified for unrestricted operation, TS *Royalist* did not routinely undertake ocean passages. She mainly sailed on coastal voyages and occasionally to near continental ports. For voyages of up to 150 miles from a safe haven (area category 1), The Blue Code required the master to hold at least a commercially endorsed RYA/MCA Yachtmaster Offshore certificate and a second person on board the vessel to hold at least a commercially endorsed RYA/MCA Coastal Skipper certificate.

Annex 7 to The Blue Code, concerning the manning of small sailing vessels in commercial use, is reproduced at **Annex D**.

The permanent and relief masters and sailing masters all held the appropriate qualifications for area categories 1 to 4, in that they all held commercially endorsed RYA/MCA Yachtmaster Offshore certificates.

Marine Guidance Note (MGN) 280(M) Small Vessels in Commercial Use for Sport or Pleasure, Workboats and Pilot Boats – Alternative Construction Standards, otherwise referred to as The Harmonised Code, is intended to provide an alternative to The Blue Code, but has not yet entered statutory force. Neither The Blue Code nor The Harmonised Code requires vessels to which they apply, to be operated in accordance with a safety management system.

1.6 THE VESSEL'S COMPLEMENT

1.6.1 The master

The master had sailed on yachts since he was a child, and first became associated with TS *Royalist* in his teens. As a young man, he had sailed offshore, and had qualified as a yachtmaster in 1994 before joining TS *Royalist* as relief bosun. He was appointed relief master in 2002 and undertook about two, one-week voyages per year, sometimes as sailing master; the last occasion he sailed as relief master was in August 2008. He regularly sailed on yachts when on leave from his work in education, and was a qualified RYA instructor.

1.6.2 The permanent staff

The permanent staff consisted of the sailing master, engineer, coxswain, bosun and cook. At the time of the accident, there was also a trainee engineer.

The sailing master was second in command to the master and was the vessel's training officer. She supervised the handling of spars and sails, and activities on deck and aloft. When the vessel was being manoeuvred under sail, she took charge of the main mast operations.

The coxswain's duties included taking the helm and operating the tender when required.

The bosun was responsible for the routine maintenance and repair of all equipment, spars, sails and fittings on deck and aloft, lifejackets and other safety equipment. When the vessel was being manoeuvred under sail, he took charge of the foremast operations.

1.6.3 The cadets

There were 23 sea cadets on board at the time of the accident. They were aged between 13½ and 18 years, and were from various units throughout the UK. Two volunteer adult watch officers accompanied the cadets.

MSN 1802 states that a trainee shall not be part of the crew for the purpose of safe manning, or be considered as a passenger even though he/she may contribute towards the cost of their welfare while on board.

1.7 SELECTION AND AUDITING OF RELIEF MASTERS

The relief master had been promoted in 2002 on the basis of his qualifications, experience and that he had served on board TS *Royalist* for many years progressively working his way up through the ranks. No formal assessment for his promotion had been conducted by the incumbent Offshore Commander or otherwise formally recorded.

No routine assessments had been made of relief masters' performance at sea before the current Offshore Commander took over the post in 2006. Since then, in addition to assessing permanent staff, the Offshore Commander has reportedly endeavoured to sea ride with all relief staff for up to one week on an annual basis. When sea riding, the Offshore Commander aims to monitor ship handling abilities, crew management, navigation and child protection. He uses no written assessment criteria for this task and, instead, makes a judgment on the basis of his experience.

Before the accident, the Offshore Commander had only assessed the relief master at sea for a few days in April 2006. At that time he was satisfied with his performance although nothing was recorded in the relief master's personal file. No assessment of the relief master's knowledge and proficiency as master had been conducted in the 3 years before the accident.

1.8 NAVIGATIONAL EQUIPMENT

The following suite of navigational aids was located in the chart room:

- Furuno GP70 MK2 GPS receiver
- AIS AIT250/chart plotter combination (with integral GPS)
- Racal-Decca Type C10 radar with Bridgemaster 2 display
- Brookes and Gatehouse echo sounder
- Brookes and Gatehouse wind direction and speed indicator

A standard magnetic compass was located forward of the steering position.

The chart plotter was installed with C-Maps electronic charts. An alarm could be set to sound when a pre-determined depth value was received from the echo sounder. Additionally, the chart plotter could be set to scan a sector ahead of the vessel and to sound an alarm for shallow water, inter-tidal areas, land, rocks, obstructions and shoreline constructions. AIS information could be displayed on the screen and the chart plotter could be set to record the vessel's track. None of these features was used during the period leading up to the accident.

There was no mandatory requirement for the AIS Class B transponder to be continuously in transmission mode. It was not transmitting during the period leading up to the accident and, therefore, no records were available for analysis as part of the MAIB investigation.

The radar incorporated a dedicated fluxgate compass to provide stabilisation: it had two variable range rings, an electronic bearing marker and a parallel indexing facility. With the exception of one variable range ring when rounding St Alban's Head, none of these features was used during the period leading up to the accident.

The vessel was not fitted with a voyage data recorder, nor was there a mandatory requirement for her to be so.

1.9 PASSAGE PLANNING AND MONITORING

1.9.1 MSSC requirements

The master's RYA/MCA Yachtmaster Offshore certificate and qualification as an RYA instructor required him to be competent in passage planning and monitoring. The course leading to the RYA/MCA Yachtmaster Offshore certificate taught methods of position fixing using GPS, radar and visual techniques. Use of navigational aids such as chart plotters, echo sounders and logs was also taught. The instruction on passage planning included: preparation of charts and the use of a notebook for route planning; routine for navigating in coastal waters; strategy for course laying; and use of waypoints and routes.

The RYA/MCA Coastal Skipper and Yachtmaster Offshore examination syllabus is reproduced at **Annex E**.

TARS required TS *Royalist* to comply with the appropriate MCA Code of Practice; in this case The Blue Code. It contained no specific requirements with respect to passage planning and monitoring, except to the extent of requiring an annual programme to be prepared and a Coastguard Form 66¹ to be completed in accordance with the Coastguard's Voluntary Safety Identification Scheme.

¹ Coastguard Form 66 – Reporting form for the CG66 voluntary safety scheme operated by HM Coastguard which registers details of vessels for SAR purposes.

The Offshore Commander's Directive included the following additional instructions related to passage planning:

Wind Limits Unless the Captain has very good reason no passage is to be commenced when winds are forecast at Force 8 or over.

Nights at Sea The aim should be to complete at least one period of 5 hours of sailing in darkness in any week at sea.

Use of Sail for Entering and Leaving Harbour With permission from the appropriate Harbour Control sails may be used for unberthing, or for leaving and entering harbour provided that the wind, tide and state of crew training permit a smart and seaman-like demonstration."

1.9.2 Published requirements and guidance

Regulation 34 of Chapter V of the International Convention for the Safety of Life at Sea (SOLAS), together with both the MCA's and the International Maritime Organization's (IMO) guidance on voyage planning is reproduced at **Annex F**.

Regulation 34 applies to all vessels which proceed to sea.

1.10 BRIDGE TEAM MANAGEMENT

Marine Guidance Note (MGN) 315(M) *Keeping a Safe Navigational Watch on Merchant Vessels* is published by the MCA and provides guidance on best practice in keeping a safe navigational watch. It is reproduced at **Annex G**.

The MGN refers to the International Chamber of Shipping's (ICS) Bridge Procedures Guide as an established principal guide to best watchkeeping practice with additional guidance on bridge resource management and the conduct of the bridge team, including the use of passage planning and integrated electronic navigation systems.

The following extracts from the ICS Bridge Procedures Guide are particularly relevant:

"Preparing a passage plan and carrying out the voyage necessitate that bridge resources are appropriately allocated according to the demands of the different phases of the voyage."

"Effective bridge resource and team management should eliminate the risk that an error on the part of one person could result in a dangerous situation."

1.11 SAFETY MANAGEMENT SYSTEMS

1.11.1 International Safety Management Code

Chapter IX of SOLAS requires sail training vessels of 500gt and upwards, and their operators, to comply with the International Safety Management (ISM) Code.

In accordance with the ISM Code, a “safety management system” (SMS) means a structured and documented system enabling company personnel to implement effectively the company safety and environmental protection policy.

The following extracts from the ISM Code are particularly relevant:

“The safety management system should ensure:

- .1 compliance with mandatory rules and regulations; and*
- .2 that applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and maritime industry organizations are taken into account.”*

“The Company should establish procedures for the preparation of plans and instructions, including checklists as appropriate, for key shipboard operations concerning the safety of the ship and the prevention of pollution. The various tasks involved should be defined and assigned to qualified personnel.”

“The SMS should include procedures ensuring that non-conformities, accidents and hazardous situations are reported to the Company, investigated and analysed with the objective of improving safety and pollution prevention.”

“The Company should carry out internal safety audits to verify whether safety and pollution prevention activities comply with the SMS.”

1.11.2 The Large Commercial Yacht Code

The Code of Practice for the Safety of Large Commercial Sailing and Motor Vessels, otherwise referred to as The Large Commercial Yacht Code, applies to sail training vessels of 24 metres in load line length and over, and less than 3,000gt. Annex 2 to the Code is reproduced at **Annex H** and provides guidance on how to develop and implement an effective safety management system for vessels under 500gt, where full certification to the ISM Code is not a requirement.

The guidance provided in Annex 2 to the Code is less extensive than the scope of requirement contained in the ISM Code. However, reference is made to the need to apply all relevant national shipping or guidance notices; to draw up procedures, which may be in the form of checklists, for the operation of the

vessel, including navigation and handling; to ensure accidents are reported to the Administration; to conduct regular inspections; and to periodically review the safety management system.

1.12 ASSOCIATION OF SAIL TRAINING ORGANISATIONS

The Association of Sail Training Organisations (ASTO) is a registered charity. Its members are the organisations that operate the UK sail training fleet, and its mission is to promote sail training and to support the UK sail training industry.

ASTO works closely with bodies such as the MCA and the RYA to ensure appropriate levels of training and regulation exist within the sail training industry. It acts as a forum for its member organisations to promote the sharing of best practice. The Association monitors compliance with the conditions of membership, which include policies and procedures in addition to those required by the regulatory framework set out by the UK Administration. It has played a role in the production of codes of practice for sailing vessels.

Of the 54 vessels that currently make up the UK sail training fleet, 2 are over 500gt, 1 is more than 24 metres registered length but under 500gt, and the remainder are less than 24 metres registered length.

1.13 PREVIOUS INCIDENTS

In 2007, one of MSSC's yachts was sailing off the south coast of the UK in light and variable winds. There were six adults on board, including a relief skipper, who decided to enter a cove and anchor for lunch. The skipper, who was very familiar with the area, was at the helm and navigating alone. While entering the cove at 2 to 3 knots, the yacht deviated from the intended track and grounded. Using the engine, the skipper managed to refloat the vessel within a few minutes, and later inspection of the hull found no resulting damage. No one on board was wearing appropriate personal protective equipment at the time of the accident.

The skipper did not report the accident either to the Sea Cadets Offshore Office or to the MAIB. However, both organisations were subsequently notified by another source. The accident was the subject of an MAIB administrative enquiry, as a result of which the Offshore Commander confirmed that all permanent and relief staff had been re-briefed that they:

- “1. Must have a sound and safe navigational plan which they must closely monitor to correct any movement off the planned track.*
- 2. Must ensure that their crew are wearing appropriate safety equipment when at sea.*
- 3. Must report any incident as quickly as possible to the Offshore Office.”*

The MAIB's accident database, which contains data relating to accidents involving UK registered vessels worldwide and other accidents within UK waters, has recorded 14 groundings of sail training vessels since 1994. Four groundings occurred in restricted waters of rivers and harbours, and the remainder were in coastal waters. Five of the vessels suffered resulting damage.

One of the above groundings involved a 23m registered length sail training vessel and occurred in similar circumstances to those of the accident involving TS *Royalist*. The case was the subject of an MAIB administrative enquiry and the following contributing factors were identified:

- The master was distracted by the hoisting of a sail while he was both steering and navigating the vessel in a restricted channel;
- The passage plan did not take into account that the vessel had left port later than intended and the height of tide would be lower than originally expected; and
- The echo sounder display could not be easily read from the helm position.

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 FATIGUE

The accident occurred during the morning of the second day of the voyage. The master had slept on board during the previous night while the vessel was moored alongside in Cowes, and there is no evidence to suggest that he was other than satisfactorily rested as a result. Therefore, it is unlikely that fatigue affected his actions or judgment, or in any other way contributed to the accident.

2.3 PASSAGE PLANNING AND MONITORING

The Offshore Commander allowed masters considerable discretion with respect to passage planning and monitoring, relying on masters' qualifications and experience rather than imposing detailed instructions or guidance. The Offshore Commander's Directive contained specific instructions relating to wind limits, nights at sea and the use of sail for entering and leaving harbour; the master was otherwise free to exercise his discretion in planning the week's voyage, having regard to the vessel's capability, forecasted weather and predicted tides.

In accordance with The Blue Code, the master held an appropriate qualification for the vessel's operation and, additionally, was a qualified RYA instructor. Attainment of these qualifications required competence in passage planning and monitoring, including the use of navigational aids. In preparing for the week's voyage, the master had familiarised himself with the chart plotter and had entered a number of waypoints. However, these did not include a passage to and from Chapman's Pool. He subsequently referred to the paper chart, and then simply used a radar range ring and the echo sounder to keep a minimum distance off the land while rounding St Alban's Head and for approaching Chapman's Pool. He entered no additional waypoints into the chart plotter and, while departing Chapman's Pool, relied purely on his pre-determined compass course of 230° for his navigation.

In accordance with Regulation 34 of Chapter V of SOLAS, which applied to TS *Royalist*, the master was required to plan the intended passage, in this case to and from Chapman's Pool, taking into account the guidelines for voyage planning contained in IMO Resolution A.893(21). In its guidance on voyage planning, the MCA recommends masters to adhere to the IMO guidelines and to ensure that all of the vessel's navigation is planned in adequate detail with contingency plans where appropriate. This includes marking clearly the intended track on the appropriate charts. As a minimum, in compliance with this advice

and to confirm situational awareness, the master should have marked the intended track on the chart in use, in this case the chart plotter, which was the only chart he was able to monitor from the helm position.

Complacency is a natural human response to repeated exposure to situations in which no adverse consequences are experienced. This inevitably results in people losing awareness of potential hazards, and induces an attitude of over-confidence in one's own ability. In turn, this leads to shortcuts being taken and procedures being disregarded.

The master had previously navigated yachts to and from Chapman's Pool without incident and, consequently, had developed a low perception of risk in respect of the operation. His decision not to mark the intended track on the chart plotter demonstrates that he had become complacent. TS *Royalist* was a larger and more demanding vessel than the yachts he had previously navigated in the area and, hence, required additional caution to be taken. The master did not take this factor sufficiently into account, possibly as a result of his infrequent and intermittent experience with the vessel, and he was over-confident that this level of planning and monitoring would suffice. A further factor contributing to his over-confidence might have been the benign weather and sea conditions.

2.4 BRIDGE TEAM

2.4.1 Watchkeeping requirements

A safe navigational watch requires effective resource management to ensure that a proper lookout is maintained and that the vessel is steered and safely navigated at all times. Historically, in traditionally designed large vessels, best practice required those three functions to be served separately by a minimum bridge team of three. However, modern developments in ergonomic design have enabled manning levels to be reduced. The conventional separate chart room has given way to a growing tendency for navigational aids, including chart plotters and radars, to be located at or within sight of the conning position. With such an arrangement, navigation, steering and lookout functions can, in certain circumstances and with caution, be effectively conducted by a single person.

MGN 315(M) lists a large number of factors that should be taken into account in deciding to combine navigation, steering and lookout duties, including the proximity of dangers to navigation, the fitting of automatic steering, the design and layout of the bridge, arcs of visibility and other duties which could be a distraction from the keeping of a proper lookout.

2.4.2 Bridge manning

The ICS Bridge Procedures Guide states:

“Effective bridge resource and team management should eliminate the risk that an error on the part of one person could result in a dangerous situation.”

The Offshore Commander's Directive gave no instructions for the manning of the cockpit. For entering and departing Chapman's Pool the master had assumed all three roles of navigation, steering and lookout. This was done without sufficient assessment of risk, including the proximity of navigational hazards, the lack of passage plan, limited visibility of the chart plotter, his own infrequent and intermittent experience, likely distractions and no briefing of any back-up from the permanent crew.

2.4.3 Setting sails

Preparations had been made for setting sails, and the master was awaiting an opportunity for doing so. As the vessel departed Chapman's Pool, the wind increased from the east and the master gave instructions for the sails to be set.

The master was aware that it would take some time for the cadets to set the sails because it would have been the first time they had carried out this task. Although the operation was being conducted under the supervision of the sailing master and the bosun, the master decided to monitor it as part of his overall responsibility. However, the priority he gave to this additional activity caused him to become distracted from steering, navigating and keeping a proper lookout.

2.4.4 Bridge team work

An essential facet of leading any task is the ability to oversee that task. Accidents most commonly occur when the person responsible for oversight becomes involved in carrying out elements of the task, often in the belief that he/she is most competent to do so.

In this case, the coxswain was available to steer the vessel if required. Had she been assigned to steer, and another crew member tasked to monitor the chart plotter, the master could have maintained overall situational awareness, and any error in navigation or steering could have been readily detected and countered. Alternatively, the master could have delayed the setting of sails until the vessel was in less restricted waters.

Additionally the use of another person to conduct the navigation could have prompted the proper use of the chart plotter and alarms.

2.4.5 Bridge team management

Bridge team management is a fundamental requirement of marine safety. The ICS Bridge Procedures Guide is an established best practice reference on the subject and dedicated training courses seek to transfer that best practice to the workplace.

The Offshore Commander's Directive included no reference to bridge team management, an area of responsibility for which the master had received no dedicated training, and, instead, left the matter entirely to the master's discretion.

Without dedicated bridge team management training or reference to best practice guidance, there were few safety barriers to prevent the relief master from thinking as a yacht skipper rather than as the master of a more complex vessel with a complement of 32. This is an important area that should be considered when developing future best practice guidelines for the sail training industry.

2.4.6 Selection and auditing of relief masters

There needs to be an established system for the selection and audit of relief masters. The potential relief master can be assessed by permanent masters with whom he/she sails but, once in command, it needs a defined procedure for the Offshore Commander to verify the individual's continued knowledge and proficiency. The current Offshore Commander has endeavoured to implement a regime of assessment but the fact that this relief master's performance in his role as master had not been assessed at sea for 3 years demonstrates the need for a more structured approach.

2.5 EMERGENCY RESPONSE

Following the grounding, the emergency signal was sounded and the cadets were instructed to don their lifejackets and to muster on deck in accordance with the onboard emergency procedures. The permanent staff closed the watertight doors and established that there was no ingress of water. The master's decisions to notify Portland Coastguard, and to have the tender stand by off the vessel, were sensible precautionary measures, particularly as the tide was falling.

Having determined that the watertight doors were shut and that there was no apparent damage or ingress of water, the master's action in attempting to refloat the vessel, initially by using the engine alone and subsequently by using *Flying Cloud* and then Weymouth RNLi lifeboat, was reasonable in the circumstances. The lifeboat crew were wise in advising that the cadets should be taken below before weight was taken on the towline, as there was a risk of injury if the towline failed.

After the vessel had been refloated, the permanent staff again checked for water ingress and found none. They also carried out appropriate machinery checks before releasing the lifeboat and returning TS *Royalist* to Gosport.

Although the master reported the accident to the acting Offshore Commander and completed an MAIB Incident Report Form (IRF) during the return voyage, the first notification of the accident from MSSC to the MAIB was by means of the completed IRF, which was received 2 days later. This was not in accordance with The Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, which require accidents to be reported to the Chief Inspector of Marine Accidents as soon as is practicable following the accident and by the quickest means available.

2.6 SAFETY MANAGEMENT

While sail training vessels of 500gt or more are required by SOLAS to comply with the ISM Code in terms of establishing a formal safety management system, smaller sail training vessels registered in the UK need only comply with safety management requirements to the extent set out in the appropriate code of practice. Although The Large Commercial Yacht Code provides guidance for vessels of 24 metres registered length and over, The Blue Code provides no such guidance for vessels of less than 24 metres registered length, such as TS *Royalist*.

Although there was no statutory requirement for TS *Royalist* to be operated under a formal safety management system, MSSC did provide a suite of safety management procedures for its fleet. However, with respect to cockpit manning and navigational practices, the causes and circumstances of this accident demonstrate that these procedures were insufficient. The only guidance to masters was contained in the Offshore Commander's Directive, which left most things entirely to the discretion of the master. No reference was provided to best practice or to guidance given by the IMO, MCA and ICS. Modern safety expectations require clear direction and guidance to be laid down by responsible managers. In particular, it is essential for MSSC to ensure that relief masters are familiar with all modern safety practices and instructions.

Following a previous accident in 2007 (Paragraph 1.13), MSSC had reported to MAIB that corrective action had been taken. This accident demonstrated that the action taken had been insufficient.

MSSC has responded extensively to this accident in improving its safety management system with regard to navigational practices.

Additionally, the MCA and the Association of Sail Training Organisations have agreed to set up a joint working group to consider the management of safety and establish best practice guidelines for the UK sail training industry.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT WHICH HAVE RESULTED IN RECOMMENDATIONS

1. There needs to be an established system for the selection and audit of relief masters. [2.4.6]

3.2 SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION WHICH HAVE NOT RESULTED IN RECOMMENDATIONS BUT HAVE BEEN ADDRESSED

1. The master had developed a low perception of risk as a result of navigating yachts to and from Chapman's Pool. He did not exercise additional caution in view of the fact that TS *Royalist* was a larger and more demanding vessel than the yachts he had previously navigated in the area; and he was over-confident that his level of planning and monitoring would suffice. [2.3]
2. The MSSC had given no instructions for the manning of the cockpit. [2.4]
3. The master assumed all three roles of navigation, steering and lookout. [2.4]
4. The priority that the master gave to monitoring the setting of sails caused him to become distracted. [2.4]
5. Had other crew members been tasked to steer and navigate, the master could have maintained overall situational awareness. [2.4]
6. The delay in reporting the accident to the MAIB was not in accordance with The Merchant Shipping (Accident Reporting and Investigation) Regulations 2005. [2.5]
7. Although there was no statutory requirement for TS *Royalist* to be operated under a formal safety management system, MSSC did provide a suite of safety management procedures for its fleet. However, with respect to cockpit manning and navigational practices, the causes and circumstances of this accident demonstrate that these procedures were insufficient. [2.6]

SECTION 4 - ACTION TAKEN

4.1 THE MARINE SOCIETY & SEA CADETS

The Marine Society & Sea Cadets (MSSC) has taken the following action:

1. Provided instructions for the echo sounder shallow depth alarm to be set and maintained at 2.5 metres below keel.
2. Investigated and corrected positional discrepancy between the Furuno and AIS GPS receivers.
3. Provided instructions for AIS Class B transmissions to continuously function when the vessel is at sea.
4. Provided instructions for the chart plotter to record track at all times when the vessel is underway.
5. Re-briefed all masters and relief masters on the essentials of passage and pilotage planning.
6. Written to masters reinforcing the message regarding navigational safety.
7. Detailed MAIB reporting and incident response procedures in the MSSC Duty Officer Out of Hours Response Instructions.
8. Amended standing orders/checklists to highlight the urgency of MAIB reporting requirements.
9. Reviewed and enhanced the briefing process for qualified relief crew members.
10. Reviewed cockpit manning for pilotage waters and high intensity operations.
11. Provided checklists appropriate to the vessel for fire, flood, collision, grounding, steering gear breakdown, man overboard, incident reporting, passage planning, equipment settings and essential vessel preparations prior to departure, equipment state and vessel preparations prior to pilotage/berthing/high intensity operations, and anchoring.
12. Revalidated risk assessments for onboard activities.
13. Re-published Offshore Commander's Directives for all vessels.
14. Updated Operating Instructions/Ships' Standing Orders.

15. Introduced procedures to ensure that relief staff are provided with a vessel update prior to duty if time elapsed is greater than 12 months from the last duty on board or when new equipment is fitted.
16. Introduced procedures to ensure that all relief staff receive the same pre-season update as permanent staff prior to the first voyage of the season.

4.2 THE MARITIME AND COASTGUARD AGENCY AND THE ASSOCIATION OF SAIL TRAINING ORGANISATIONS

Are establishing a joint working group to consider the management of safety and establish best practice guidelines for the UK sail training industry.

4.3 THE MARINE ACCIDENT INVESTIGATION BRANCH

The MAIB has provided a flyer containing a summary of the details of the accident, and the safety lessons identified during its investigation. The flyer will be distributed to operators of sail training vessels (**Annex I**).

SECTION 5 - RECOMMENDATIONS

The **Marine Society & Sea Cadets** is recommended to:

2009/171 Develop a structured system for the selection and audit of relief masters.

The **Association of Sail Training Organisations** is recommended to:

2009/176 Promulgate the safety lessons learned from this accident by distributing the MAIB flyer on its investigation to the ASTO membership.

**Marine Accident Investigation Branch
December 2009**

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