Isle of Man

Ship Registry

Casualty Investigation
Report No. CA103

Isle of Man Registered "FICUS"

Grounding

27th February 2008

Contents

Foreword

This investigation was carried out as a joint investigation between the Isle of Man Ship Registry and the Bahamas Maritime Authority. The Isle of Man Ship Registry wishes to acknowledge the contribution to this investigation by the Bahamas Maritime Authority and to thank it for its co-operation and support.

The fundamental purpose of investigating a casualty, an accident or an incident under these Regulations is to determine its circumstances and the cause with the aim of improving the safety of life at sea and the avoidance of accidents in the future.

It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

Under Section 4 of the Isle of Man Merchant Shipping Act 1985 and section 170(2) of the Bahamian Merchant Shipping Act a person is required to answer an Inspector's questions truthfully. If the contents of this report were subsequently submitted as evidence in court proceedings then this would contradict the principle that a person cannot be required to give evidence against themselves.

Therefore the Isle of Man Ship Registry and the Bahamas Maritime Authority makes this report available to interested parties on the strict understanding that it will not be used in any court proceedings anywhere in the world.

Acknowledgements

The author would like to acknowledge the following for their valuable help and assistance during this investigation;

- The Officers and Crew of the Ficus
- Shell International Trading and Shipping Company Limited
- Det Norske Veritas

Abbreviations Used In This Report

ARPA	Automatic Radar Plotting Aid
AIS	Automatic Identification System
°C	Degrees Celsius
CPA	Closest Point of Approach
ECDIS	Electronic Chart Display and Information System
GPS	Global Positioning System
GT	Gross Tonnage
hPa	Hectopascal
IMO	International Maritime Organisation
Kts	Knots measured in Nautical Miles per hour
°T and °G	degrees True and degrees Gyro
LT	Local Time
m, m^3, cm	Metres, cubic metres, centimetres
nm	Nautical Miles (1nm=1852 metres)
OOW	Officer of the Watch
SD	Statutory Document
SMS	Safety Management System
TCPA	Time to Closest Point of Approach
t	Tonnes where (1t=1000kg)
UTC	Universal Coordinated Time
VDR	Voyage Data Recorder
VHF	Very High Frequency
WO	Wheel Over
WP	Waypoint

Summary

Photo taken whilst the vessel was aground

On the 27th February 2008 at 09:11local time the Oil/Chemical Tanker “Ficus” grounded in shallow waters off Goulding Cay, New Providence Island, Bahamas during a large alteration of course. The vessel was altering course for the final leg of the Passage Plan before picking up the pilot at Clifton Pier, New Providence Island, Bahamas.

The vessel was loaded with approximately 25600t of non-persistent Oil Cargo. Fortunately all of the oil cargo was contained on board and there were no injuries to any ship personnel and no pollution to the marine environment. The vessel sustained significant structural damage to the ship’s bottom. The limestone shelf seabed was damaged as a result of the vessel making contact whilst making way and when the vessel became firmly aground.

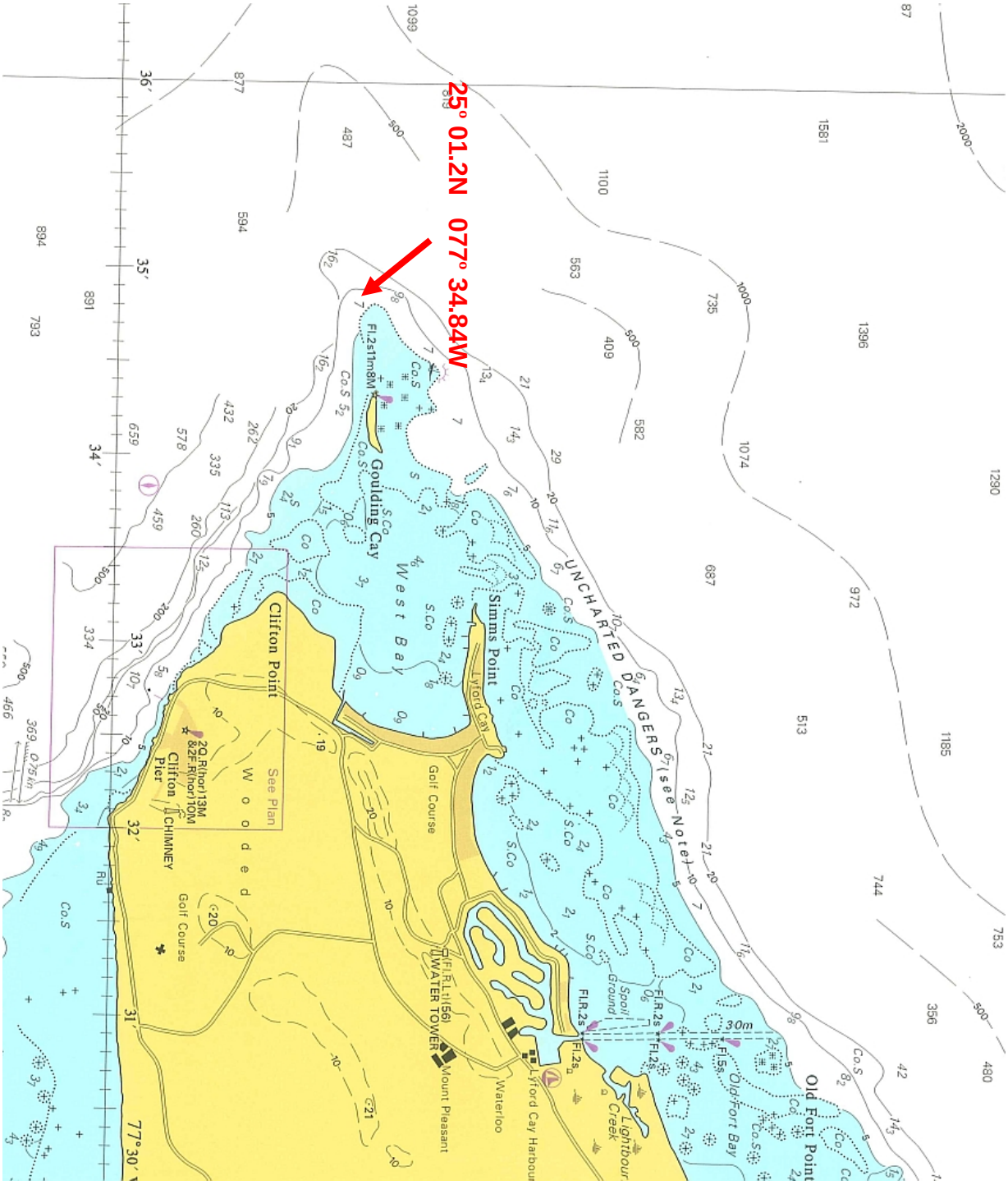
The Officer of the Watch and Helmsman were the bridge team leading up to the grounding. The Master arrived on the bridge immediately prior to the grounding. The Master had intended to be on the bridge earlier for the course alteration but was preoccupied in his cabin with preparing port paper work.

The report concludes that human error was the cause of the grounding. The Officer of the Watch altered course too early, failed to control the turn sufficiently and lost his situational awareness during the turn. Actions to rectify the situation proved ineffective and may have been hampered by the wind conditions.

1. Narrative of Events

The following is a narrative of events based on witness statements, evidence collected on board and the Ficus' Voyage Data Recorder. All times are the Ficus' Ship time which had been set to Local Mean Time (UTC -5hrs).

1.1 Location of Grounding



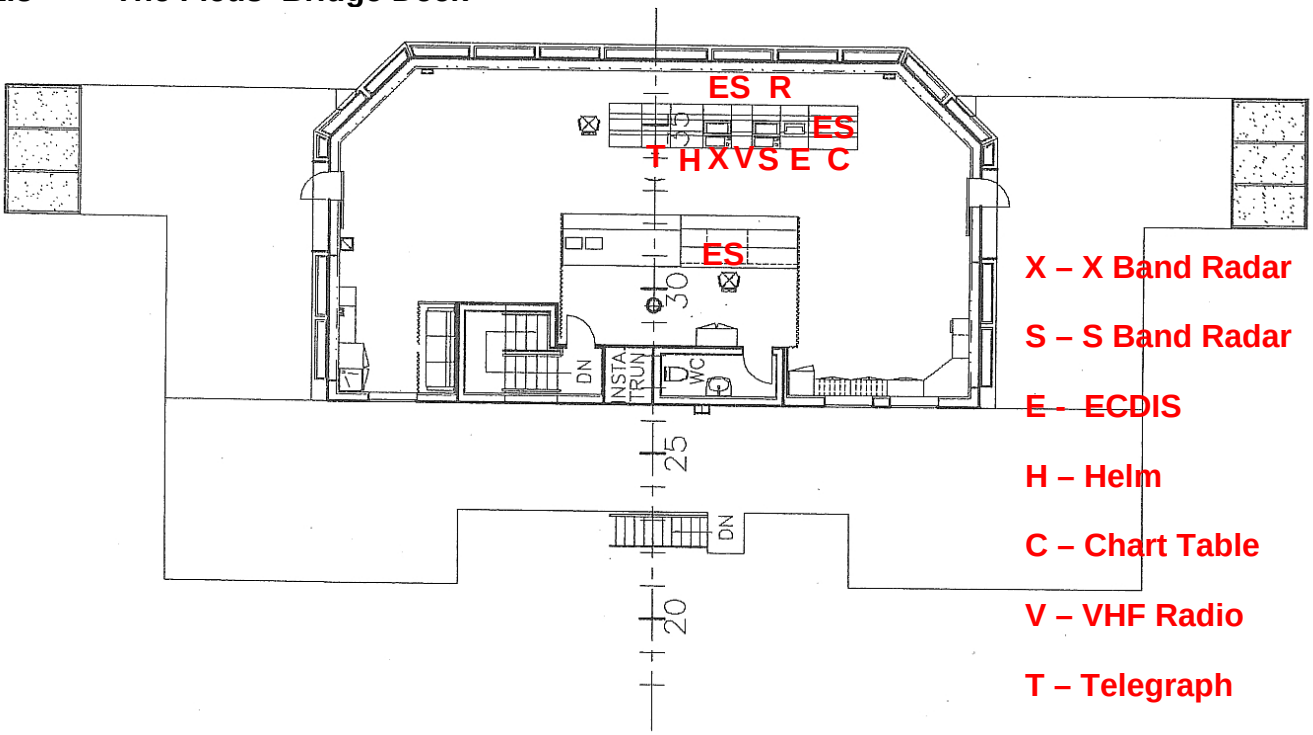
Section of Chart BA 1489 – "New Providence Island". Reproduced by kind permission from the UK Hydrographic Office

1.2 The Ficus – Ship Particulars

Source: Shipspotting.com

Flag – Isle of Man
Technical Managers – Shell International Trading and Shipping Company Limited
Owner – Angelique Shipping Ltd, Monrovia
Ship Type – Oil/Chemical Tanker
Classification Society – Det Norske Veritas
IMO No. – 9216913
Year Of Build – 2000
Call Sign – ZNRI4
Cubic Capacity – 54346m^3
Length Overall – 183.40m
Beam – 31.96m
Summer Draught – 11.986m
Sailing Draught – 8.72m (departure from Curacao)
Gross Tonnage – 27539
Net Tonnage – 13092
Deadweight – 44788t (Summer)
Crew Complement – 24 Officers and Crew (Indian, Pakistani and Filipino nationalities including the Master and 2 Cadets)
Cargo on board – Total of 25600t non-persistent Oil cargo of 3 grades

1.3 The Ficus' Bridge Deck



X – X Band Radar

S – S Band Radar

E - ECDIS

H – Helm

C – Chart Table

V – VHF Radio

T – Telegraph

R – RoT Indicator (on deck head)

ES - Echo Sounder

1.4 Events Leading up to the Grounding (all times are Local Mean Time, UTC-5 Hours)

23rd February 2008

The Ficus departed Curacao with a cargo of 25600t non-persistent Oil cargo bound for Clifton Pier, New Providence Island in the Bahamas. The vessels departure draught is 8.72m even keel. The vessel proceeded as per its approved Passage Plan and expected to arrive at Clifton Pier 3 days 3 hours later at an estimated speed of 13.5 knots.

27th February 2008

0500 The Master goes to the bridge after waking up to check the progress of passage in preparation for arrival. The OOW(4-8) shows the Master some instructions pencilled on the chart by the OOW(12-4) about calling the Master prior to arrival at the pilot station, giving one hours notice to the Engine Room and switching on an additional steering motor. The Master agrees with the instructions and returns to his cabin a short while later.

0740 The OOW(4-8) is currently responsible for the navigation watch and is assisted on the bridge by the Lookout(4-8). The vessel is proceeding on course as per the approved Passage Plan on a track of 224°T at a speed of 12.4kts (speed over ground) at sea speed. The trackpilot is engaged whereby the helm is controlled from the helm's track control system with track data fed from the ECDIS. One steering motor is in use.

0745 The Master is called by the OOW(4-8) as per the instruction on the Chart.

The OOW(4-8) gives one hours notice for Standby engines to the Chief Engineer as per the instruction on the Chart and also informs the OOW(8-12). The Duty Engineer commences Main Engine RPM slow down to manoeuvring RPM on the load program.

~0750 The OOW(8-12) arrives on the bridge for duty as the 8-12 Navigational Watchkeeper and proceeds to make himself familiar with the prevailing circumstances and conditions as per the Watch Handover Checklist.

0752 The OOW(4-8) calls Port Nassau Pilots on the VHF Radio. There is no response.

0755 The Lookout(8-12) arrives on the Bridge. He discusses the watch with the Lookout(4-8) and assumes Lookout duties for the 8-12 watch. The Lookout(4-8) leaves the bridge a short time later.

0756 The OOW(4-8) calls Port Nassau Pilots on the VHF Radio. There is no response.

0757 The OOW(4-8) calls Port Nassau Pilots on the VHF Radio. There is no response.

0800 The local weather conditions recorded as stated in section 2.6.

0801 The Master is called by OOW(4-8) informing him there is a telephone call on the satellite phone on the bridge.

0803 The Master arrives on the bridge to take the phone call from the Chartering Department. The watch handover is complete, the watch handover checklist is signed and the OOW(4-8) leaves the Bridge.

0805 The second steering motor is switched on as per the Instruction on Chart and the pre-arrival checklist.

0806 The Master finishes his phone call and then looks at the radars and the chart. The Master states to OOW(8-12) that "there is a problem with the pilot boat and they may not be boarding, they are looking into it".

The Master instructs the OOW(8-12) to switch the AIS to "Low" power mode in preparation for arrival to the berth.[*This is a company instruction (only applicable to vessels calling at New York). The task involves plotting positions and inputting data into the AIS unit. This would normally take around 3-4 minutes if carried out without interruption*].

The OOW(8-12) then commences the Pre-Arrival Checklist. The Pilot Information Card had already been prepared by the OOW(4-8).

The Master leaves the bridge a short while later and goes to his cabin. The Master decides to work on his report for a Commercial Inspection of the vessel to be conducted on arrival at Clifton Pier.

0820 The OOW(8-12) calls Port Nassau Pilots on the VHF Radio. There is no response.

0829 The OOW(8-12) calls Port Nassau Pilots on the VHF Radio. There is no response.

0833 The OOW(8-12) calls Port Nassau Pilots on the VHF Radio. There is no response.

0834 The OOW(8-12) calls Harbour Control on the VHF Radio. There is no response.

0836 The OOW(8-12) calls Harbour Control on the VHF Radio. There is no response.

0842 The OOW(8-12) calls Port Nassau Pilots on the VHF Radio after hearing the harbour Control on the VHF Radio, there is no response.

0845 The OOW(8-12) fixes the vessel using a range and bearing from Old Fort Point and plots this on the chart as the 0847 fix.

0850 The OOW(8-12) calls Port Nassau Pilots on the VHF Radio. There is no response.

0852 The OOW(8-12) asks the Lookout(8-12) "What is that black thing?" The Lookout(8-12) replies "A tree" [*Referring to the solitary tree on Goulding Cay – see Annex 1*].

0853 The OOW(8-12) fixes the vessel using a range and bearing from Goulding Cay and plots this on the chart as the 0855 fix.

0855 The OOW(8-12) switches the S Band radar to 3nm Range. The OOW(8-12) calls Port Nassau Pilots on the VHF Radio. There is no response.

0856 The OOW(8-12) calls the Master and informs him the vessel is approaching the next waypoint (approx 2.5nm away) and the pilots were not answering the VHF calls. The OOW(8-12) asks what side the Pilot ladder should be rigged. The Master instructs "Port side, 2 feet above the water".

The OOW(8-12) then calls the Bosun on a hand held VHF Radio and instructs him to rig the pilot ladder on the Port side, 2 feet above the water.

0857 The OOW(8-12) fixes the vessel using a range bearing from both Goulding Cay and Simms Point and plots this on the chart as the 0900 fix.

0901 The ECDIS alarm sounds (position is 25º 02.687N 077º 35.363W). The OOW(8-12) instructs the Lookout(8-12) to man the wheel and carryout helmsman's duties. The OOW(8-12) then switches the helm from trackpilot control to manual helm control and orders "port 5" in position 25º 02.560N 077º 35.400W [*Indicating 5 degrees of port rudder to be applied*]. The helmsman acknowledges the order by stating "port 5" and applies Port 5º of rudder.

Refer to Annex 2A showing the helm control.
Refer to Annex 3A for a VDR radar screenshot for when the "Port 5" order was given.

The OOW(8-12) then states to the helmsman "our next course is 121". The helmsman then acknowledges "121".

0902 Approximately 78 seconds after giving the "Port 5" order the OOW(8-12) then orders "midships" to the Helmsman. [*Indicating zero degrees of rudder angle to be applied*]. The helmsman places the helm position zero and confirms to the OOW(8-12) by stating "midships now" once the rudder angle indicator signifies zero 4 seconds later.

Refer to Annex 2B showing the rudder angle indicator.
Refer to Annex 3B for a VDR radar screenshot for when the "midships" order was given.

0903 With the vessel still turning to port under the vessels own momentum the OOW(8-12) calls Nassau Port Control on the VHF Radio. There is no response.

0904 The OOW(8-12) and the helmsman notice that the rate of turn indicator was showing 30º per minute to port and attempts to reduce the rate of turn by ordering "Starboard 5" [Indicating 5 degrees of starboard rudder to be applied] to the helmsman (position is 25º 02.066N 077º 35.690W). The helmsman acknowledges this order by stating "Starboard 5".

Refer to Annex 2A showing the Helm control.
Refer to Annex 2B showing the Rudder Angle indicator.
Refer to Annex 2C showing the Rate of Turn Indicator.
Refer to Annex 3C for a VDR radar screenshot for when the "starboard 5" order was

given.

0904 The OOW(8-12) orders “midships” to the Helmsman approximately 14 seconds after giving the “Starboard 5” helm order. [*Indicating zero degrees of rudder angle to be applied*]. The helmsman places the helm position zero and confirms to the OOW(8-12) by stating “midships” once the rudder angle indicator signifies zero.

0905 The OOW(8-12) fixes the vessel using a radar range and bearing from Simms Point and plots this on the chart as the 0906 fix.

0906 The OOW(8-12) orders “go to 121” to the Helmsman. [*Indicating that the helmsman is to steer a course of 121^{o} on the Gyro compass*]. The helmsman acknowledges this by stating “121”.

Refer to Annex 3D for a VDR radar screenshot for when the “Go to 121” order was given.

0907 The OOW(8-12) states “I think we will alter course, steady 150”. The helmsman asks him to repeat by saying “Ay?”, the OOW(8-12) then orders ”150”. [*Indicating that the helmsman is to steer a course of 150^{o} on the Gyro compass*].The helmsman acknowledges this by stating “150”. The position is 25^{o} 02.407N 077^{o} 34.987W.

Refer to Annex 3E for a VDR radar screenshot for when the “Steady 150” order was given.

0909 Approximately 104 seconds after being given the “150” helm order, the OOW(8-12) repeats to the helmsman “150”. The Helmsman acknowledges this by saying “150” when the vessel is in position 25^{o} 02.407N 077^{o} 34.987W to tell the OOW(8-12) that the vessel heading is 150^{o} on the gyro compass. The OOW(8-12) acknowledges this by saying “150”.

The OOW(8-12) checks the range and bearing off Simms Point on the radar but this is not plotted on the chart.

Refer to Annex 3F for a VDR radar screenshot for when the helmsman states “150”.

0910 The Master arrives on the Bridge and goes to the port side bridge wing door. The vessel heading is approximately 150^{o}G. He perceives the land (Goulding Cay) on the port side to be closer than expected. The Master notices the engine RPM is indicating 100RPM and instructs the OOW(8-12) to inform the Engine Room that standby engines will be at 0912 and that he will now take the con. The OOW(8-12) goes to the chart table to log the fact that the Master has taken the con and then ring the Engine Room.

A bump is felt by crew in the Engine Room. As the OOW(8-12) picks up the phone heavy shuddering is felt and a loud grating noise was then heard. The sound lasts for approximately 30 seconds. The vessel is now making contact with the seabed as the vessel’s speed is reducing. The Master’s initial thought was “what is that noise?” [*It is not recognised at this point that the vessel is grounding*.]

0911 With the increasing vibrations the Master now realises that the vessel is grounding or about to ground. The Master places the engine telegraph to “Stop” and orders the Helmsman “Hard-a-Starboard”. The OOW(8-12) and the Helmsman both shout out “Hard-a-starboard”. The helmsman acknowledges that the rudder angle is hard-a-starboard approximately 15 seconds later by stating “hard-a-starboard now”. The vessel’s speed eventually indicates 0 knots and the vessel is firmly aground at 09:11.30LT in position 25^{o} 01.2N 077^{o} 34.84W. The Master then realising that the vessel is now aground goes to the Chart Table to check the vessel’s position.

Refer to Annex 3G for a VDR radar screenshot for when the vessel is aground.

No injuries were sustained to any personnel on board the vessel and there was no pollution to the marine environment.

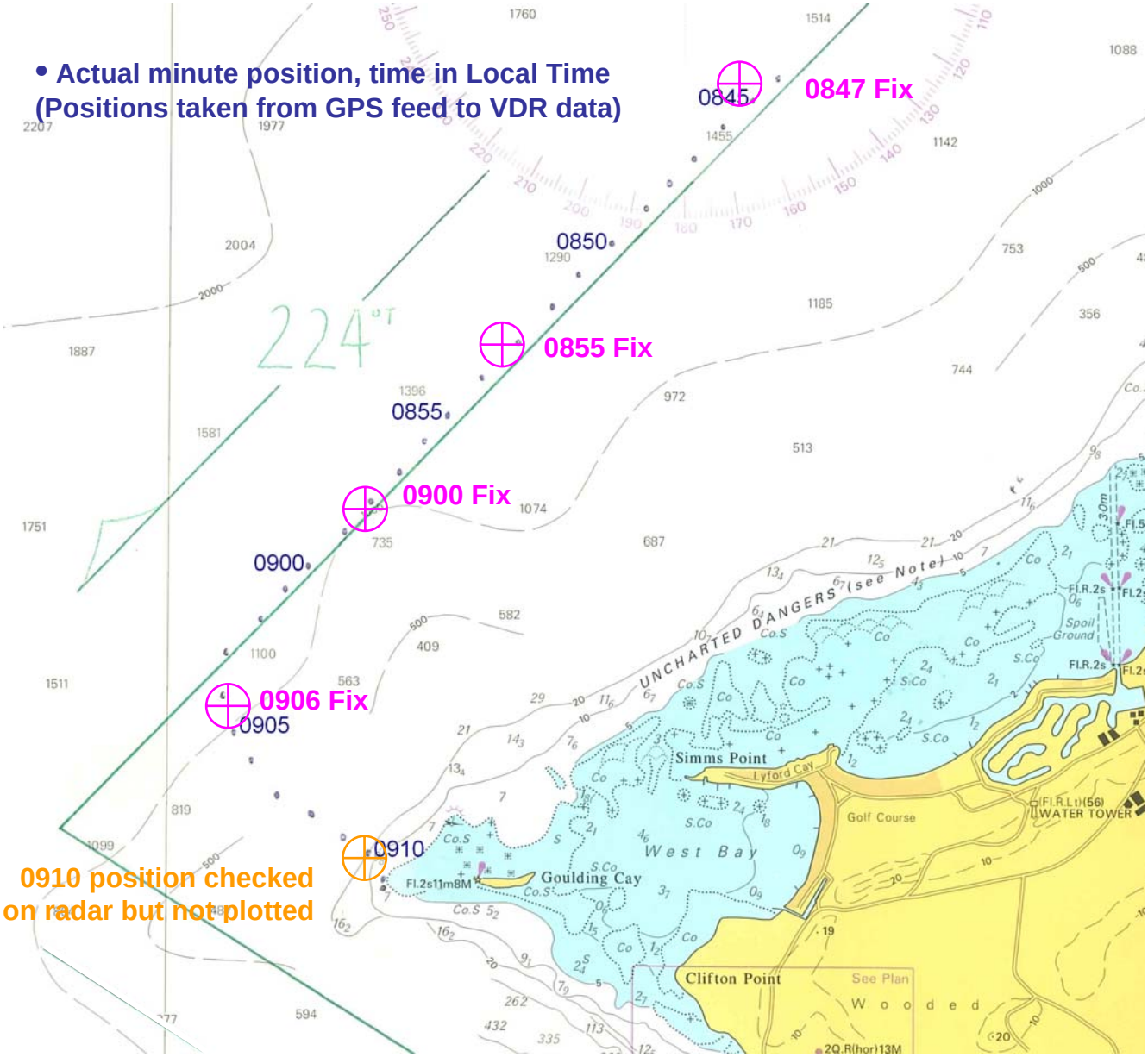
Immediate Events Following the Grounding

The vessel Superintendent travelling with the vessel immediately arrives on the bridge. Deck and Engine Room departments check the vessel’s tanks and take soundings around the vessel. The emergency contingency plan for grounding is implemented. The Superintendent calls the Managing Office in London and the company shipping emergency response plan was immediately activated.

The largest parcel of cargo was eventually discharged to a lightering barge. The vessel was refloated on 5th March 2008 when it proceeded to Clifton Pier to discharge the remainder of the cargo. The vessel then went to a drydock for repairs.

1.5 Vessel Tracks Leading Up To The Grounding

The chart extract below shows a minute by minute account of the vessel's actual track starting at 0844LT and ending at 0912LT. The chart extract also shows the positional fixes taken by the OOW(8-12) that were plotted on the chart.

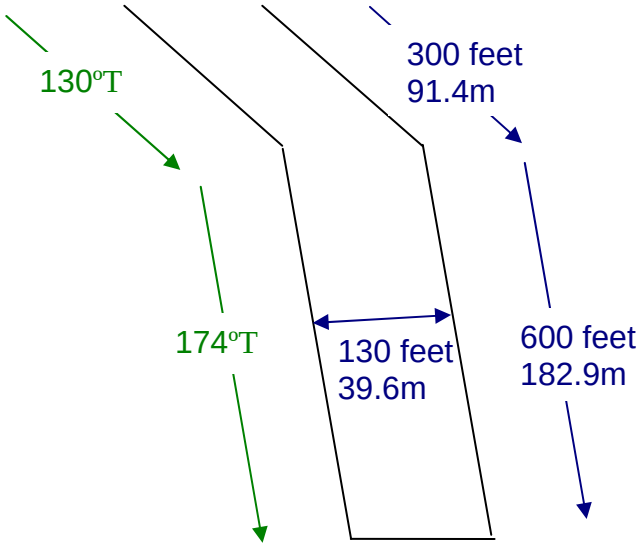


1.6 Damage to the Ficus and the Seabed

Damage to the Ficus
The Fore Peak suction valve was found cracked leading to a slight ingress of water in the fore peak tank.

Significant indentation along most of the hull plating on the vessel's bottom was sustained.

Damage to the Seabed
The nature of the seabed where the Ficus grounded was predominantly a "limestone shelf" with some coral growth. A divers assessment of the affected area showed the line of grounding to be approximately:-



Not drawn to scale

2. Comment and Analysis

Foreword

This section aims to analyse the circumstances leading up to the grounding of the vessel. The factors affecting the bridge team and bridge equipment will be discussed including the vessel's Passage Plan, external environmental conditions and the course alteration which ultimately led to the grounding of the vessel.

2.1 Manning & Bridge Team on the Ficus

The vessel is manned in excess of the requirements of the Minimum Safe Manning Certificate. When the vessel grounded the bridge team consisted of the following;

The Master
One minute before the vessel was firmly aground the Master had informed the OOW(8-12) that he was taking the con in preparation for arrival to the pilot station. With the Master at the con he would expect to receive traffic and positional information from the OOW(8-12) and assistance from the OOW(8-12) coordinating with ships personnel in preparation for arrival.

An examination of the Master's certification found him to be suitably qualified and medically fit to be the Master of the vessel. The Master has been a Master for 17 years and has 21 years experience on tanker vessels. The Master has been with the company for approximately 9 months.

The OOW(8-12)
When the watch handover was complete the OOW(8-12) became the Officer of the Watch and the Master's representative on the bridge responsible for the safe navigation of the vessel. Assisting him was the Lookout(8-12) providing visual information. The OOW(8-12) is expected to utilise all the bridge resources effectively to safely navigate the vessel in accordance with the Passage Plan, the company SMS and Master's Standing Orders. Should the OOW(8-12) need extra assistance the Master has clearly emphasized that he is to be called. When the Master took over the con the Role of the OOW(8-12) changed to supporting the Master.

An examination of the OOW(8-12)'s certification found him to be suitably qualified and medically fit to perform the duties of Officer Of the Watch (Navigation) on the vessel. The OOW(8-12) has been qualified for 9½ months and has 9½ months experience on tanker vessels with the company. The Master stated that found the OOW(8-12) to be a competent Officer and had no concerns about his abilities to carry out his duties effectively.

Approximately 2 weeks before the grounding the OOW(8-12) participated in a series of Man Over Board Drills where he manoeuvred the vessel in a "Scharnow" Turn under the supervision of the Master. The Master stated the turn was well executed and controlled effectively.

The Lookout(8-12)
When the vessel grounded the Lookout(8-12) was at the helm of the vessel performing the role of helmsman. Earlier in the watch the Lookout(8-12) was assisting the OOW(8-12) with visual lookout duties. The VDR data indicates that there was an exchange of information between the two.

This function was performed by a “Junior Ordinary Seaman” under the company’s ranking structure. An examination of the Lookout(8-12)’s certification found him to be suitably qualified and medically fit to be an ordinary seaman and perform duties as a Navigation Watch Rating.

2.2 Effects of Fatigue

The Hours of Rest for the Master, OOW(8-12) and Lookout(8-12) were examined. The records showed that the Hours of Rest recorded exceeded the minimum requirements of the Hours of Rest Regulations[1]. The Master, OOW(8-12) and Lookout(8-12) stated that they had not experienced any effects of fatigue prior to the grounding.

2.3 Effects of Drugs or Alcohol

The Master, OOW(8-12) and Lookout(8-12) stated that they had not been taking any medication prior to the grounding.

Following the grounding urine samples were taken from the Master, OOW(8-12), Lookout(8-12) and the duty Engineer Officer. All samples returned negative results.

[1] SD757/02

2.4 The Ficus' Bridge Equipment

The Ficus is required by flag state legislation (SD269/04) to carry Shipboard Navigational Systems and Equipment as specified in SOLAS Chapter V Regulation 19 depending on the size and age of the vessel. This equipment is type approved and subject to annual survey.

At the time of the grounding the following bridge equipment was reported to be defective:-

1. Doppler Speed Log
2. X Band Radar faults – system faults
3. X Band Radar Scanner bearing
4. S Band radar performance monitor missing

Items 1 and 2 were stated on the Bridge handover checklist that each officer signed as acknowledged. SOLAS 74/78 Ch. V Reg 12 (o) states "defective bridge equipment may not necessarily make the vessel unseaworthy but requires that the defective equipment is repaired as soon as possible in a port with suitable facilities." The above faults are not considered significant enough to render the vessel unseaworthy.

All faults were recorded in the vessel's defect reporting system with evidence to suggest that the items were being addressed. Other minor faults to other bridge equipment were recorded but these are not significant to the cause of the grounding

The Gyro Compasses
There were no recorded defects with any of the compass systems and no problems with the compasses had been noted by any of the Navigation Watch Officers. An examination of the Compass Error records indicate that checks of any errors to the Gyro Compasses were frequently carried out. Records for the preceding week mainly show a gyro error of Nil.

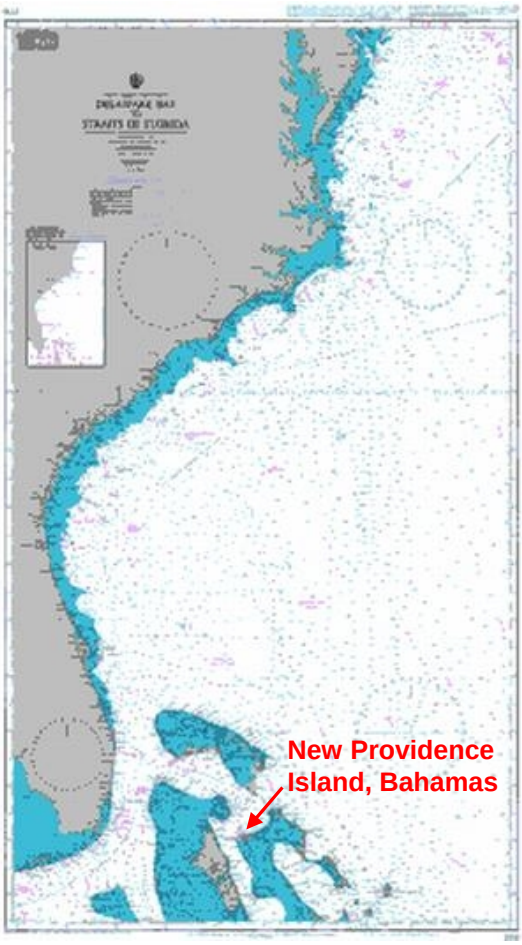
The Ficus' Charts and ECDIS
The vessel's primary means of navigation is by use of the paper charts as prescribed by the Safety Management System. An ECDIS System is installed on board the Ficus in addition to paper charts as an additional aid to navigation for the officer of the watch. The Company's SMS states

"Where an ECDIS unit is installed, a full set of available Electronic Charts should be arranged through the Operations Superintendent / Charts Supply Company, suitable for the vessels normal trading area and commensurate with the vessels Paper Chart Folio. This is to include regular correction supply. The system of charts to be used is to be determined by the Operations Superintendent. The ECDIS is provided as an aid and the paper chart is to be used for the provision of primary navigational information. Should any differences exist in data that on the paper chart should take precedence."

There was clear evidence on board of a system provided to keep the charts up to date and that the electronic charts had the latest updates applied.

The largest scale ECDIS Chart the Ficus had on board for the area was chart BA2710 - Delaware Bay to Straits of Florida as shown on the right. The particulars of the Chart are as follows -
Natural Scale: 1:1500000
Chart Limits:-
North-39° 00'.00N East-72° 00'.00W
South-23° 30'.00N West-82° 04'.00W

The largest scale paper chart for the area is BA1489. This was the paper chart in use by the OOW(8-12). BA1489 is available as an electronic chart for use on ECDIS systems however the vessel did not possess the licence in order to use it so it was not available on board. The vessel's position was displayed on the ECDIS to the Officer of the Watch as 'zoomed in' on chart BA2710, and thus not showing as much detail as the BA1489 paper chart.



Source:- www.UKHO.gov.uk

Radars
The Bridge is equipped with two ARPA Radars, a 3cm X Band Radar and a 10cm S Band Radar. Two radar screens were in use both displaying data received from the S Band Scanner only. The X Band scanner unit was not 100% functional due to a bearing problem and was only used for port arrivals. At sea the X Band radar was being used as a slave from the S Band Scanner unit.

The SMS states the following regarding the use of the radars;

"Safe water mapping and parallel indexing must be used to their full potential. It is important to remember when using ARPA for collision avoidance, the ship's speed through the water should be used rather than speed over the ground. "

Parallel Indexing was not used during the 8-12 Watch by the navigating Officer prior to the grounding. The speed log is used to feed the ARPA radars with speed through the water data in order to calculate CPA and TCPA. CPA and TCPA are useful to navigation watch officers as an aid to determine if risk of collision exists. The GPS unit was instead used to feed speed over the ground data to the ARPA radars.

Track Control System
The SMS states the following regarding the “Nautopilot” Track Control System.

“As the vessel approaches a waypoint, the Nautopilot will alarm and flash the heading to which it is about to alter. If all is well and traffic is clear, the Officer of the Watch presses the Set button and, using the Rate of Turn setting and Rudder Limit as set, the Nautopilot will take the vessel onto the next track. Should traffic not be clear and the Set button not be pressed, the Nautopilot will not alter to the next heading. It will however try to alter towards the new track within the limits of the Heading Change which could be up to 15 degrees. To prevent this happening, course control should be selected using the current heading.”

The ECDIS system was set to alert the OOW 2 minutes prior to reaching the Wheel Over Position. The OOW has to initiate the track control system to alter course to the next track otherwise the system will continue approximately along the same course within the heading change limits. The OOW(8-12) acknowledged the alarm and chose to alter course by manual helm control. If the OOW(8-12) had chosen to use the Nautopilot for the course alteration the system would have tried to steer the vessel along the curved track represented by the dashed line as shown in the diagram in Section 2.8.

Helm
There were no reported problems/defects with the manual or automatic helm control systems.

GPS Units
The vessel is equipped with two GPS units. A bridge checklist requires that the positions calculated by these two units are crossed checked a minimum of every 4 hours to monitor any errors and further cross checked against another position source, eg radar range and bearing if attainable. The accuracy of GPS fixes varies and is accepted as a condition of their use. The most recent comparison prior to the grounding showed a negligible discrepancy between the calculated positions of the two GPS units.

2.5 Changing the Con

<u>OOW(4-8) to OOW(8-12)</u>
The Ficus’ established watch rotation required a change of watch for the Bridge Team (the OOW and Lookout) at 0800LT. The Company SMS system requires that a checklist is completed to facilitate the information exchange between the OOWs. The OOW(8-12) arrived on the bridge shortly before 0750 for the 8 to 12 watch where he proceeded to make himself a drink and then walk around the bridge and make himself familiar according to the requirements of the checklist. A discussion was held between the OOW(4-8) and OOW(8-12) for the handover of the watch and the forthcoming arrival at Clifton Pier.

The handover checklist was found properly completed for the change of watch with information relating to the defects of the Doppler Log and the X Band Radar noted on the checklist too.

The Lookout(8-12) arrived on the Bridge at 0755LT. He briefly discussed the watch with the Lookout(4-8) and then assumed Lookout duties for the 8-12 watch.

OOW(8-12) to the Master

When the Master arrived on the bridge at 0910LT in preparation for arrival at the pilot station he was informed that the vessel was 2½nm from the pilot station. No other information concerning the prevailing circumstances and conditions was stated by the OOW(8-12). After walking to the port side bridge wing door the Master began to make himself familiar with the prevailing circumstances and conditions. The Master was aware that the vessel had been slowing down and that the engine RPM was now at the manoeuvring range. The Master informed the OOW(8-12) that he was taking over the con and instructed the OOW(8-12) to call the Engine Room with the time of Stand By Engines.

2.6 External Conditions

At 0800LT the local environmental conditions were as follows:-

Wind – South, Beaufort Force 7 [28-33knots – near gale]
Air Pressure – 1020hPa
Temperature – dry 23°C
Visibility – 10.8nm
Sea – rough
Swell – moderate, short length – 2-4m height and 0-100m in length]

No precipitation recorded.

Between 0800-0911LT the wind is recorded on the vessel's anemometer as veering. Around the time of the grounding the wind was South West Beaufort Force 7.

The tidal Information predicted at Nassau, New Providence Island (25° 05'N 077° 21'W) at 0900LT was 0.8m and rising. High water was at 1200LT at height 1.0m. The tidal range for the day ranged between 1.1m and 0.6m.

2.7 The Passage Plan

A detailed passage plan was prepared for the voyage from the berth in Curacao to the berth at Clifton Pier. The Passage Plan was prepared in accordance with the procedures in the Company SMS taking into account the requirements of the vessel's Master. The SMS requirements for Passage Planning is based on the Guidelines for Voyage Planning (IMO Resolution A.893(21)) – See Annex 5.

Extracts from the company SMS requirements pertaining to Passage Planning and the Master's Standing Orders relevant to the Safe Navigation of the vessel are outlined below with comment.

Appraisal

SMS

"The appointed Navigator is responsible to the Master for appraising the plan. In considering the parameters for appraising the plan he should consider the points raised in the reference publications listed below. These include, but are not limited to, various factors to be considered by the Navigator in preparing the passage. Examples of these factors are:

Minimum allowed passing distances from danger areas; Position and characteristics of navigation marks, lights buoys etc.; Depth of water, height of tide; Tidal streams, direction and rate; Current direction and rate; Anticipated leeway; Ship's Manoeuvring Data; Meteorological conditions and the ability to obtain fixes; Traffic Separation Schemes; Ice limits and Icing Risk.
The Navigator himself should consider and consult at least, but not be limited to, the following during appraisal:

Navigation Charts; Routeing Charts; Ocean Passages for the World; Pilot Books; Notices to Mariners; Navigational Warnings; Meteorological Information; Current Atlases; Loadline Chart; Tidal Information; Light Lists; Radio Signal Volumes; Ship's Manoeuvring Data; Mariners Handbook; Port Information Books; Distance Tables or Computer Program; Past Passage Plans.

Using the information from the above sources and considering the parameters governing the passage, the Navigator can then appraise and commence detailed planning of the passage. Initially, if appropriate, he should identify alternative routes for consideration by the Master who will then decide which route he requires to be worked in detail."

Comment

The following points should be read in conjunction with the points of Section 2.1 of Guidelines for Voyage Planning (IMO Resolution A.893(21)) – See Annex 5.

1. Including the vessel's reported defective equipment the vessel was considered to be in a seaworthy condition prior to proceeding to sea. The vessel's stability was calculated to be permissible under the requirements of the Isle of Man Load Line Regulations (SD492/00), manoeuvring data was displayed on the bridge. There were no operational limitations restricting the safe navigation of the vessel.
2. There were no limitations imposed on the passage plan by the cargo on board.

3. The Officers and Crew Certification were inspected and found to be compliant with the Isle of Man Manning and Training Regulations (SD727/02) and the STCW Convention. The Hours of Rest records were inspected and found in compliance with the Requirements of Hours of Rest Regulations. See Section 2.2.

4. The vessel's trading Certificates were inspected and were found to be in order at the time the vessel sailed from Curacao.

5. Paper charts are used as the primary method of safely navigating the vessel with the ECDIS used as an aid. The paper charts used for the Passage were inspected and found corrected up to the most recent Weekly Notices to Mariners at that time with Temporary and Preliminary Notices applied as necessary. Radio navigation warnings were being received by the vessel and applied as necessary. There were no navigation warnings applicable to the area in force when the vessel grounded.

6. Sailing Directions, List of Lights and List of Radio aids to navigation were on board and corrected up to date.

7. The vessel has numerous nautical publications and information on board relating to the passage from Curacao to Clifton Pier to cover the requirements of the IMO Guidelines and forms part of the SMS. It was required that a local pilot would be employed to assist the Master with the safe navigation from the pilot station to the vessel's intended berth at Clifton Pier. At 0801LT the Master was informed by phone that it was uncertain if a pilot would be available for the vessel on arrival. The vessel was proceeding to the Pilot Station as per the Passage Plan with the aim of finding out on arrival information relating to the pilot boarding and in turn the berthing prospects. The vessel had information relating to the berth where it was intended to moor the vessel. The vessel experienced only light traffic conditions throughout the Passage.

Planning

SMS

"The passage plan should be in three sections:

- Berth to commencement of sea passage (outward pilotage).
- Deep Sea Passage.
- End of Passage to Berth (inward pilotage)."

"The plan should consist of the use of which is compulsory, and either Form [Passage Planning], Form [Alternative Route] and Form [Waypoint List] … The inclusion of navigational notes, particular references to sections of pilot books etc., and photocopies of the most relevant information is encouraged. Additionally, the plan should include:

- Specification of the primary and secondary means of position fixing.
- The minimum acceptable frequency of position fixing for each section of the passage."

"Information contained in the plan but not presented on the chart or on the forms should, where possible, be presented in sections per waypoint or a group of waypoints. This will ensure that relevant information required for a certain part of the voyage, e.g. a watch, is easily accessible to the Officer of the Watch."

"Masters are reminded that under the contract of carriage, which is normally the Bill of Lading, there is an overriding undertaking, binding upon the shipowner,

that the voyage will be carried out without any unnecessary delay, and that the vessel will take the safest and most direct course to the discharge port or place shown in the Bill of Lading. The Master has discretion to select safe and direct courses through navigational considerations, but any deliberate departure from these considerations, including stopping or turning back other than for safety, breakdown, or to render assistance, may constitute a deviation, unless there is a liberty clause in the Bill of Lading which particularly permits the ship to carry out certain named operations which would otherwise be deviations from the voyage."

Master's standing Orders

"Voyage Planning is the prime responsibility of the second officer for laying off courses berth to berth. A full passage plan is to be prepared – radar mapping is to be available, parallel indexing is to be set up on the charts and no go areas highlighted".

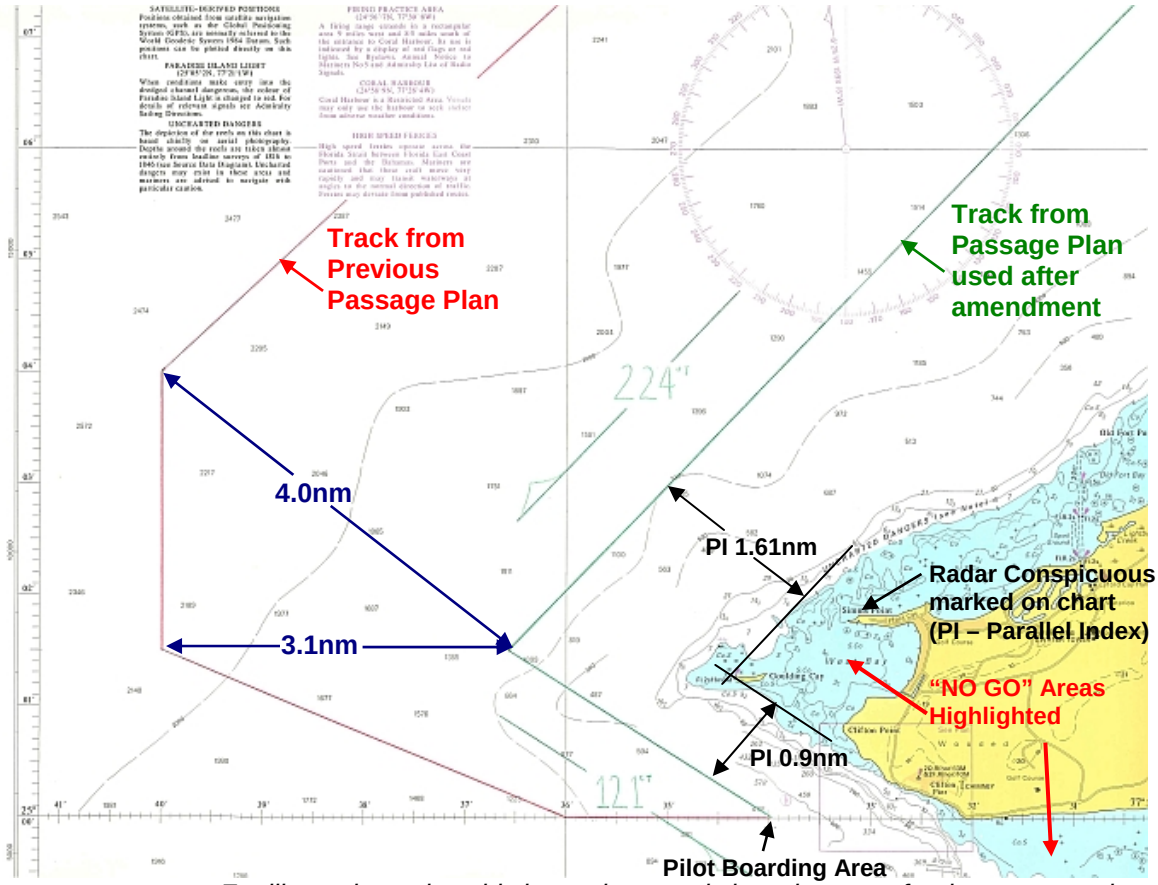
Comment

A detailed Passage Plan of a high standard was prepared in compliance with the SMS and the Master's Standing orders. Navigation of the vessel was planned from berth to berth. There was also much ancillary information prepared that was available to the OOW that included for example extracts from Sailing Directions, List of Radio Signals and local berth information.

The vessel has conducted the voyage from Curacao to Clifton Pier in the past and the previous passage plan was used as a basis for drawing up the new passage plan. The Passage Plan was authorised by the Master and signed by all of the OOWs as having read and understood the Passage Plan.

During the course of the voyage the Master ordered as a matter of safety, some changes to the passage plan to increase the passing distance from Cape Egano, Dominican Republic (increased from 10nm to 12nm) and from Silver Bank, south east of Bahamas Islands (increased from 12nm to 15.5nm measured from the 20 fathom line).

The Master also amended the waypoints in the vicinity of Goulding Cay to a new waypoint approximately 2nm west off Goulding Cay. This amendment increased the proximity to the shallow waters off Goulding Cay. The Master stated that the changes were made in order to "reduce the distance" and that he "intended to be on the bridge for the alteration of course from 224ºT to 121ºT". This intention was also verbally communicated to the navigating Officers. The following diagram shows a comparison between the previous Passage Plan and the newly amended Passage Plan.



For illustration only – this is not the actual chart drawn up for the passage plan

Paper charts were drawn up with the track on the largest scale charts with the true direction of the intended track indicated. The charts were clearly marked with "No Go" danger areas, parallel indexing and radar conspicuous targets for position fixing. As per the SMS requirement the frequency and means of position fixing was indicated chart BA1489 as Primary means (Radar range and bearing) and Secondary means(GPS) at intervals not exceeding 6 minutes and 3 minutes in the Clifton Pier Plan.

The minimum Under Keel Clearance was indicated in the Passage Plan as a minimum of 10% (of vessel's draught) at all times. Course alteration points were clearly indicated in the Passage Plan, on the Charts and the ECDIS system. The course alteration point from 224°T to 121°T was clearly identifiable in the Passage Plan, on the Navigation Charts and on the ECDIS System. The chart was also highlighted with the position when the Main Engine slow down should commence. This was not part of the Passage Plan and was a point calculated by the navigator and shown to the Master to which the Master gave his consent.

Chart BA1489 was highlighted with contingency arrangements for anchoring and a pilot abort point for the vessel to turn around and proceed back to sea if the pilot failed to arrive. The 121°T track is shown to have a PI of 0.9nm from Goulding Cay. This track runs approximately 0.5nm from the 10m depth contour at the closest point. At half ahead the vessel's tactical diameter for a hard a port manoeuvre is approximately 0.25nm thus leaving 0.25nm (approximately 463m) clearance if this manoeuvre was needed.

Execution

SMS

“Once finalised, the execution of the plan will be dependent on the status of navigational equipment, tides, daylight, traffic density, meteorological conditions and manpower availability.”

“The prime responsibility of the Officer of the Watch is to the safety of the vessel and its complement. He is to maintain a proper lookout … until duly relieved by the Master or a person appointed by the Master. He is also responsible for safely following the passage plan and compliance with the Company's navigation procedures and the Master's orders.”

“The Master must be called to the bridge immediately in accordance with the requirements of his Standing Orders, or if any Officer of the Watch is in doubt as to his ability to deal with a particular situation.”

Master’s Standing Orders

“Do not do any work which can be construed as a distraction to lookout”
Some of the Master’s many “*Call Me*” requirements include:-
“If you are any doubt as to the position of the vessel.
If you are in any doubt as to the safety and security of the ship
I would rather be called sooner and more frequently for minor concerns, than too late or not at all and find the vessel in crisis or impossible situation.”

Comment

The changes to the Passage Plan were made at the Master’s discretion. Changes to the tracks at sea were made to increase the passing distance from hazards whilst the vessel was being navigated by the OOW. The change to the waypoint at Goulding Cay was made to reduce the overall distance knowing the increased proximity to the shallow waters was an acceptable risk since the Master had intended to be on the bridge at that time.

The bridge team consisted of the OOW(8-12) and the Lookout(8-12). The Bosun was on the main deck with a VHF Radio and was contacted by the OOW(8-12) about making preparations for arrival, ie preparing the pilot ladder and clearing the anchors. The Engine room was manned and making preparations for arrival. The ‘Standby Engines’ order never came as the vessel grounded immediately prior to the call being made.

Since taking over responsibility for the safe navigation watch, the workload of the OOW(8-12) steadily increased. Prior to altering course the OOW(8-12)’s tasks included:-

1. Navigating the vessel on track control system, keeping a visual a radar lookout, position fixing approximately every 6 minutes
2. Pre-arrival checklists (including numerous VHF calls to Nassau Port Control and liaising with the Master and Bosun).
3. Setting up the AIS on low power mode.

OOW(8-12) stated that he did not feel ‘in doubt’ or distracted but acknowledged he was “busy”. He did not feel it necessary to call the Master to the Bridge to assist because he continually assumed the Master would be on the bridge

shortly in preparation for arrival at the pilot station. The OOW(8-12) stated he had no problem with calling the Master to assist on the bridge and has done so on numerous previous occasions. The Master was called at the arranged time approaching the waypoint but did not go to the bridge straight away due to preparing port paper work and then changing his clothes.

The alteration of course from 224°T to 121°T will be discussed separately in Section 2.8.

Monitoring

SMS

"Monitoring of the plan commences immediately on departure from the berth. The methods of monitoring depend to some extent on the equipment available. Completion of Standard Form [Passage Planning] in the Ship Reporting & Recording Manual is compulsory."

"The vessel's position should be monitored and checked by more than one navigation system at frequent intervals. As danger increases, the frequency of position fixing should also increase. Traditional methods, i.e. visual and radar bearings and radar ranges, should be crosschecked by electronic information and Bridge Check List …used as instructed.
In order to monitor the vessel's position continuously, Radar Mapping and Parallel Indexing should be used whenever possible. When Radar Mapping is used in GPS stabilised mode, Parallel Indexing provides an independent cross-check on map accuracy."

"Safe water mapping and parallel indexing must be used to their full potential".

"On every occasion of approaching land, and before soundings are reached, all sounding equipment should be checked to ensure that it is in working order and ready for use as required. It should be noted that echo sounders are calibrated to give depths below the transducer."

Master's Standing Orders

"Parallel indexing is to be carried out at every available opportunity"
"Echo sounder should be operated in all depths below 100 metres".

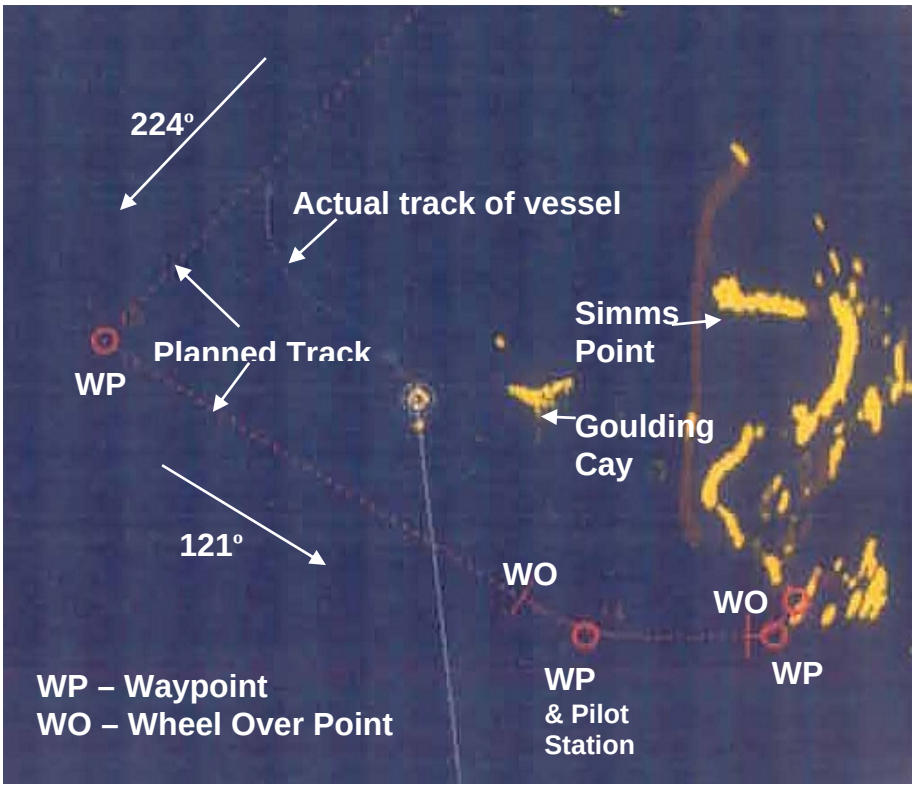
Comment

The Passage Plan was available at all times on the bridge to the navigating watch officers.

Parallel Indexing on the radar was not used at all in the watch by the OOW(8-12) prior to the grounding despite numerous Parallel Indexes marked on the charts and being a requirement of the Master's Standing Orders. Documentary evidence indicates that the OOW(8-12) has been made familiar with the requirements of the SMS and Masters standing orders, yet the OOW(8-12) neglected to use Parallel Indexing. This may indicate an over reliance on the track control system keeping the vessel to track without cross checking the vessel's proximity to hazards using parallel indexing.

Echo sounder was switched on display mode only. The readings were displayed to the OOW(8-12) from the Echo Sounder and the two display units as shown in Annex 2D and Section 1.3. The printer function of the echo sounder was not turned on as the depth of water was in excess of 1000m during the 8-12 watch and such depths were too deep to produce an echo sounding reading on the standard ship's equipment. There was an instruction on the chart immediately prior to the waypoint indicating when to switch the printer on but this was not done.

The following Radar screen shot shows how the track is displayed to the OOW on the Radar Screens.



Picture taken following the grounding where the pilot station is shown the next waypoint.

Nb. A similar view of the track is also displayed on the ECDIS. The paper charts are used as the primary method of navigation and the GPS and ECDIS systems are used as secondary means.

It can be seen in Section 1.5 that position fixing was generally carried out at the prescribed intervals of 6 minutes (±1 minute). The diagram also shows that there is a period of up to two minutes between the range and bearing being taken and the time being marked on the chart. The position fixes on Chart BA1489 were primarily by radar range and bearings, some fixes from a single point and other fixes from two points. Visual bearings were not carried out.

Whilst the vessel was proceeding on track with the helm in 'track control' mode the OOW(8-12) was able to monitor the vessel's position and progress by any of the following means:-

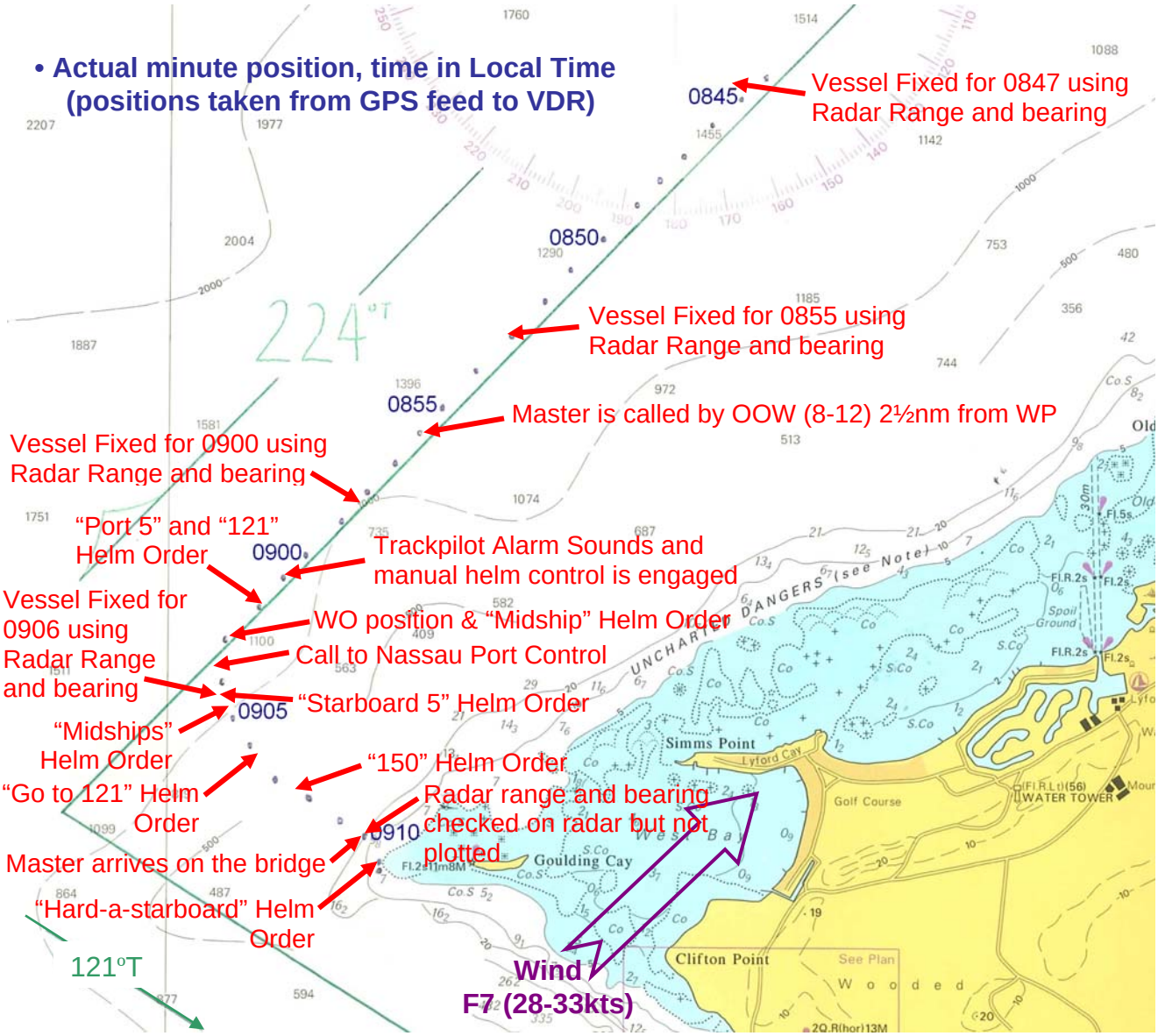
1. By visual bearings off prominent landmarks.
2. By radar – ie range and bearings plotted on the paper charts and Parallel

Indexing.

3. A track line displayed on the radar generated by a feed from the ECDIS system.
4. By monitoring the ECDIS system displaying route and track data. The ECDIS systems display the position of the vessel fed from a GPS system on a ‘zoomed in’ electronic chart (see section 2.5 regarding the ECDIS).

2.8 The Course Alteration

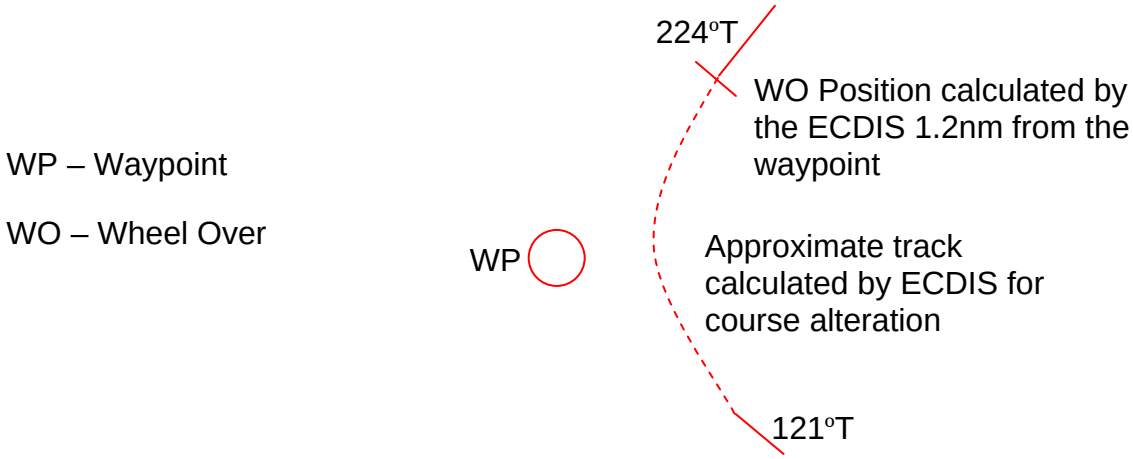
The chart extract of BA1489 below shows the significant events immediately prior to and during the course alteration leading up to the grounding of the vessel.



At 0901LT the ECDIS alarm sounded which indicated to the OOW that the vessel was 2 minutes away from the Wheel Over position as calculated by the ECDIS for alteration to the next course. On the basis of this alarm the OOW (8-12) decides he will alter course using manual helm control. The OOW(8-12) immediately instructs the Lookout(8-12) to take the wheel and be the helmsman. The helmsman's role is to carry out helm or course orders as directed by the OOW. The vessel's position was last checked at 0858LT and marked on the chart as "0900".

The OOW(8-12) switches the helm control from track control mode to manual helm control (as shown in Annex 2A) and immediately orders "Port 5" rudder to be applied by the helmsman. The following diagram shows the track information displayed to the OOW(8-12) on the radar and ECDIS screens for the alteration of

course from 224°T to 121°G. The curved track, represented by the dashed line, is calculated by the ECDIS based on a set turn radius and represents the track the steering system would follow for the course alteration if selected by the OOW. Having decided to alter course manually the OOW(8-12) alters course 1 minute before the calculated Wheel Over Position, his intention being that by applying 'Port 5' Rudder the vessel will come slowly round approximately on the dashed line displayed to him on the radar screen.



The OOW(8-12) is aware the next course is 121°T and confirms this with helmsman by stating "our next course is 121". As the vessel's heading changes to port the OOW(8-12) orders "midships" to the Helmsman when the vessel's heading is 192°G approximately 78 seconds after giving the "Port 5" order. The helmsman places the helm position zero and confirms to the OOW(8-12) by stating "midships now" once the rudder angle indicator signifies "0" four seconds later. This is an attempt not to allow the rate of turn to increase (possibly decrease) and to allow the vessel to change heading under her own momentum.

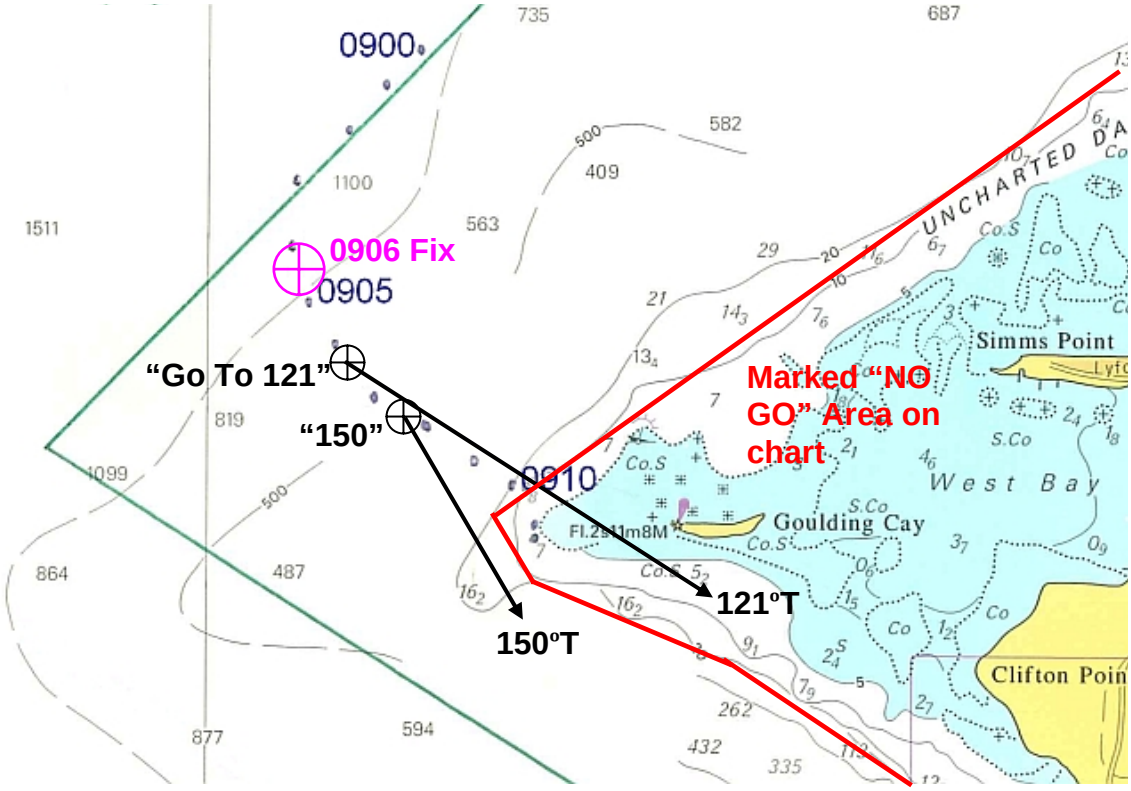
As the vessel changes heading to port under her own momentum the OOW(8-12)'s thoughts turn again to the fact that he has still not been in contact with the Local pilots. He calls Nassau Port Control again on the VHF radio and again there is no response.

The OOW(8-12) and Helmsman notice that the indicated Rate of Turn is indicating 30°/min to port (see annex 2C). It is likely the South Westerly Force 7 wind helped to increase the rate of turn once the wind was on the starboard side of the vessel. The course recorder in Annex 4 shows the change in the vessel's heading during the period prior to altering course and after the vessel had grounded. The average rate of turn during the period 0904-0907LT is 25°/min. Where the OOW(8-12) and the helmsman saw the Rate of Turn indicator at 30°/min, then this rate must have lasted only momentarily.

In an attempt to slow the rate of turn down the OOW(8-12) orders "starboard 5". Approximately 14 seconds later the OOW(8-12) orders "midships" and thus ceases the check helm applied to reduce the rate of turn. The vessel then proceeds for 90 seconds with no helm applied and still turning to port under her own momentum. The OOW(8-12) then states to the helmsman "go to 121". This is acknowledged by the helmsman who then begins to steer a course of 121°G

(gyro).

The following chart extract of BA1489 shows the implications of steering a course of 121°G. It is clear the OOW(8-12) has lost his situational awareness at this point with respect to the safe navigation of the vessel and in particular the position of the vessel. By steering a course of 121°G the vessel's track will be taken directly through the "No Go" areas marked on the chart and the shallow waters that would lead to the vessel grounding.



After approximately 46 seconds the vessel's heading reaches 123°G and Goulding Cay is approximately 1 point off the port bow. The OOW(8-12) then states to the helmsman "I think we will alter course, steady 150". The helmsman asks him to repeat by saying "Ay?", the OOW(8-12) then orders "150". The helmsman acknowledges this by stating "150" and steers the ship accordingly.

The chart extract of BA1489 above shows the implications of steering a course of 150G. The "150" order indicates that the OOW(8-12) is attempting to steer clear of the "No Go" area by a narrow margin. The "150" order was not based on a plotted position and it is likely that the course decision was arbitrary based on looking at either the radar, 'zoomed' in ECDIS chart or out of the bridge window. A more decisive and significant alteration of course was needed at this point in order to steer the vessel to safe waters and to counteract any effects of the South Westerly Force 7 wind.

Approximately 104 seconds after being given the "150" helm order, the OOW(8-12) repeats to the helmsman "150". The Helmsman acknowledges this by saying "150". The vessel's turn to starboard may have been hampered by the Force 7 wind blowing on the starboard side. The vessel's proximity to the shallower waters off Goulding Cay is also increasing The OOW(8-12) checks the vessel's

position by radar range and bearing off Simms Point but this is not plotted on the chart.

When the Master arrives on the bridge and goes to the port bridge wing he ‘senses’ that something is peculiar due to the proximity of Goulding Cay on the port beam. The vessel proceeds on the same heading and gradually starts to ground as the depth of water rapidly decreases due to the quickly shelving seabed. The Master (not realising the vessel’s bottom is now making contact with the seabed) quickly determines by looking at the chart and by sighting the proximity to Goulding Cay, that the vessel’s position and heading has put the vessel in a dangerous situation. The Master orders a “hard-a-starboard” manoeuvre in an attempt to steer the vessel out to safe water. This manoeuvre changes the heading of the vessel whilst making contact with the seabed but the speed of the vessel rapidly falls to zero and the vessel becomes firmly aground.

Conclusions

The main cause of the grounding was human error. Mechanical or equipment failure was not a contributing factor.

The OOW(8-12) failed to safely navigate the vessel as per the prescribed Passage Plan in accordance with the SMS and Masters Standing Orders which resulted in the grounding of the vessel. The Passage Plan was detailed and of a high standard, however the Master's amendments to the waypoint at Goulding Cay increased the vessel's proximity to navigational hazards.

It is likely that the OOW(8-12) lost his situational awareness during the course alteration with respect to the position of the vessel and the implications of his helm orders. Ordering the "121" course following the turn would have directly led to the grounding of the vessel. The subsequent action to correct this by ordering "150" proved ineffective. The vessel's alteration to 150°G may have been hampered by the South Westerly wind with the leeway also increasing the vessel's proximity from the shallow waters off Goulding Cay. The hard-a-starboard helm order by the Master was unfortunately too late as the vessel had already made contact with the seabed which in turn was slowing the vessel down.

The OOW(8-12) altered course from 224°T to 121°T too early. It appears that the decision to alter course was not based on establishing the vessel's position first but being led by the track pilot alarm sounding. The OOW(8-12) had numerous resources available to cross check the vessel's position yet they were not fully utilised. The OOW(8-12) did not anticipate the effects of the SW'ly Force 7 for the large alteration of course.

It would have been prudent for the OOW(8-12) not to have altered course the until the port beam was at least level or passed Goulding Cay. Since there was a narrow margin for error on the 121°T leg to the north of the planned track it would have been safer to alter course when the 121°T Parallel Index for Goulding Cay was attained and then the wheel put over. To the south and west of the vessel there was a large expanse of safe and deep water.

The OOW(8-12) failed to comply with the SMS and Master's Standing Orders by not using Parallel Indexing to monitor the vessel's proximity to land.

The rate of change of heading during the course alteration was greater than what the OOW(8-12) had anticipated. The helm orders given to control the rate of turn failed to adequately control the rate of turn to bring the vessel round to the next track.

The OOW(8-12) had several work items to manage at the same time on approach to the waypoint and pilot station. These included:-

- Keeping a lookout and Navigating the vessel including the large alteration of course from 224°T to 121°T
- Completing items of the bridge pre-arrival checklists which included
    - Attempting to contact Nassau Port Control numerous times by VHF

Radio who repeatedly failed to acknowledge or respond
- Liaising with the Bosun on deck and the Master in his cabin.

The Master was not on the bridge as intended for the course alteration. The Master allowed himself to become preoccupied with a Commercial Inspection report required to be completed on arrival at Clifton Pier.

An additional bridge team member would have been beneficial for the arrival at the pilot station and it is very likely this would have prevented the grounding of the vessel. Had the Master been on the bridge as intended or called by the OOW(8-12) for assistance this would have also alleviated the workload on the OOW(8-12). The OOW(8-12) did not feel in doubt and did not call the Master for the alteration of course as he continually assumed the Master would shortly be on the bridge for the arrival at the pilot station. An additional Bridge team member may have also questioned the OOW(8-12) about his decision to alter course so early and reappraise the situation.

The external environmental conditions are not considered as a significant contributing factor to the cause of the grounding. It is likely that the south westerly Force 7 wind may have affected the vessel's turning characteristics when altering course but the wind is not considered a primary contributing factor to the cause of the grounding.

Traffic conditions were very light during the 8-12 watch prior to the course alteration. There were no other vessels in the immediate vicinity of the Ficus when the decision to alter course from 224°T to 121°T was made. Therefore the actions of other vessels were not a contributing factor to the cause of the grounding.

There were no effects of fatigue or drugs/alcohol to any of the bridge team and thus are not contributing factors to the cause of the grounding.

Recommendations

The Isle of Man Ship Registry is recommended to:-

Distribute this report to Shell and the Officers and Crew concerned

Forward a copy of this report to the Indian Maritime Authority.

Shell International Trading and Shipping is recommended to:-

Consider formalising manning levels on the bridge as part of the passage plan.

Emphasise the importance of basic navigational principles to sea staff.

Reinforce the principle that the Master and Crew should at all times prioritise the safety of the vessel over routine administration.

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

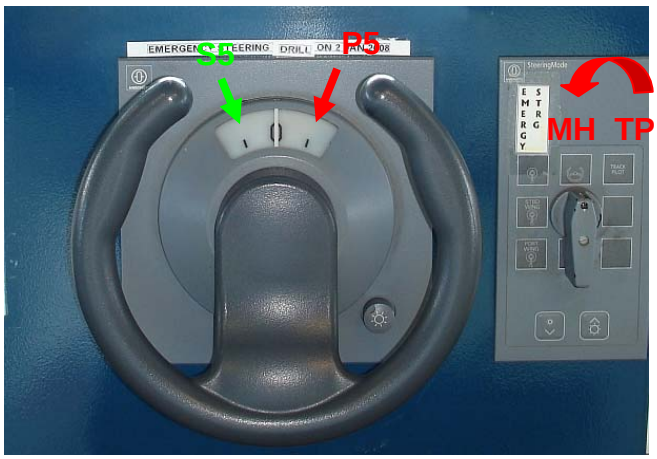
Annex 1

Goulding Cay and Simms Point Looking approx East by North

Picture taken from vessel whilst aground.

Annex 2

Annex 2A
Helm Control



TP – Trackpilot control
MH – Manual Helm control

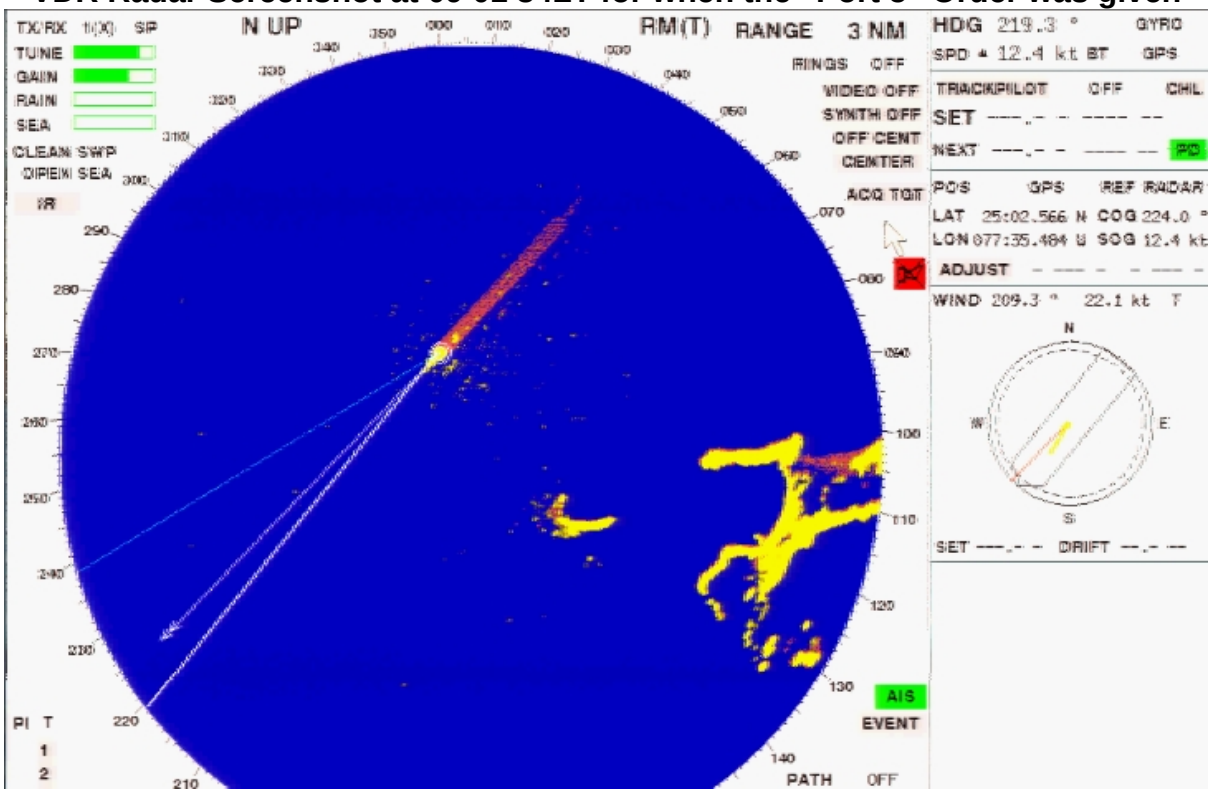
Annex 2B
Rudder Angle Indicator

P5 – Port 5 indicated
S5 – Starboard 5 indicated

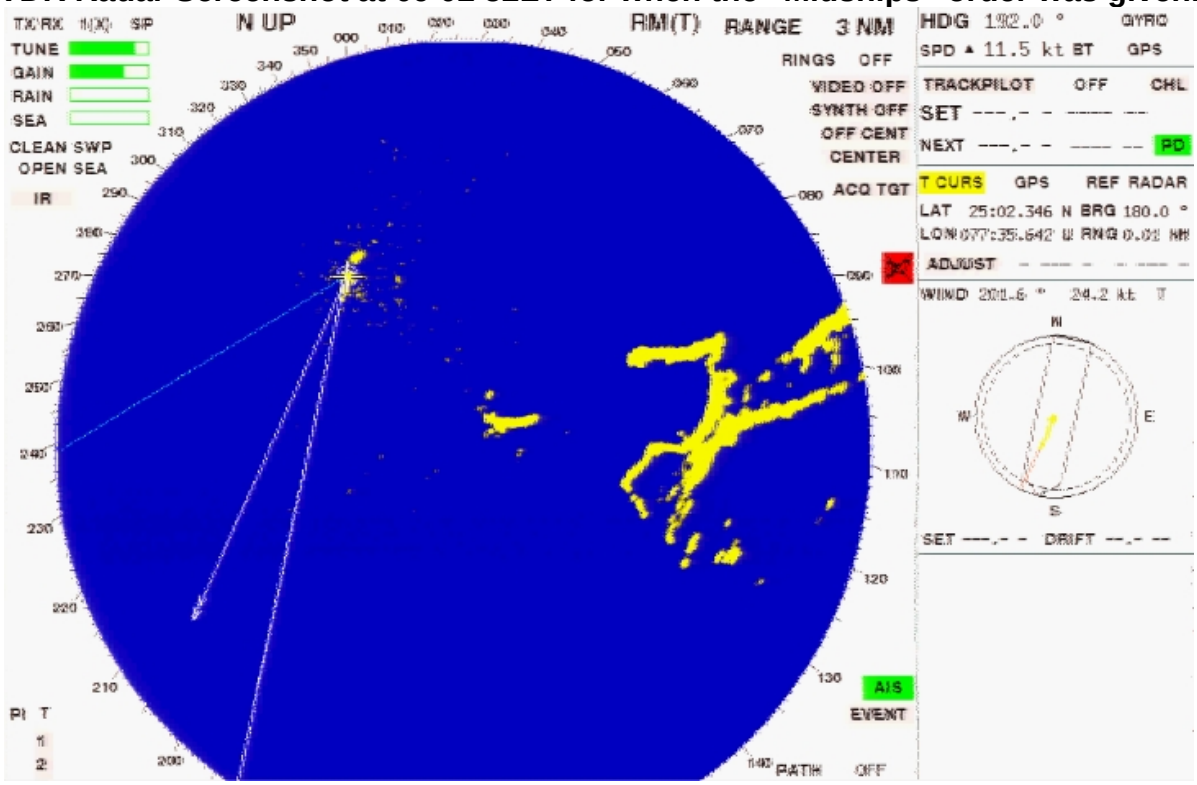
Annex 2C
Rate of Turn Indicator

Annex 2D
Echo Sounder Repeaters

Annex 3A
VDR Radar Screenshot at 09 01 34LT for when the “Port 5” Order was given

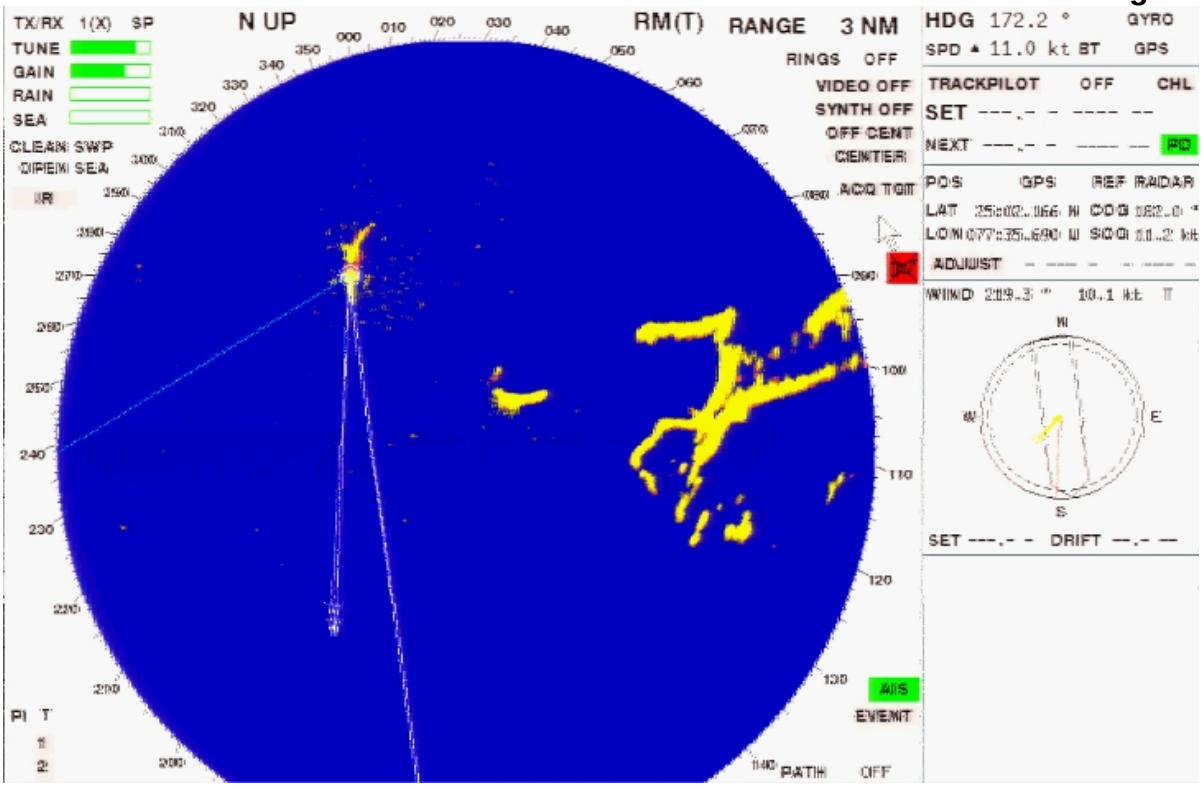


Annex 3B
VDR Radar Screenshot at 09 02 52LT for when the “Midships” order was given.



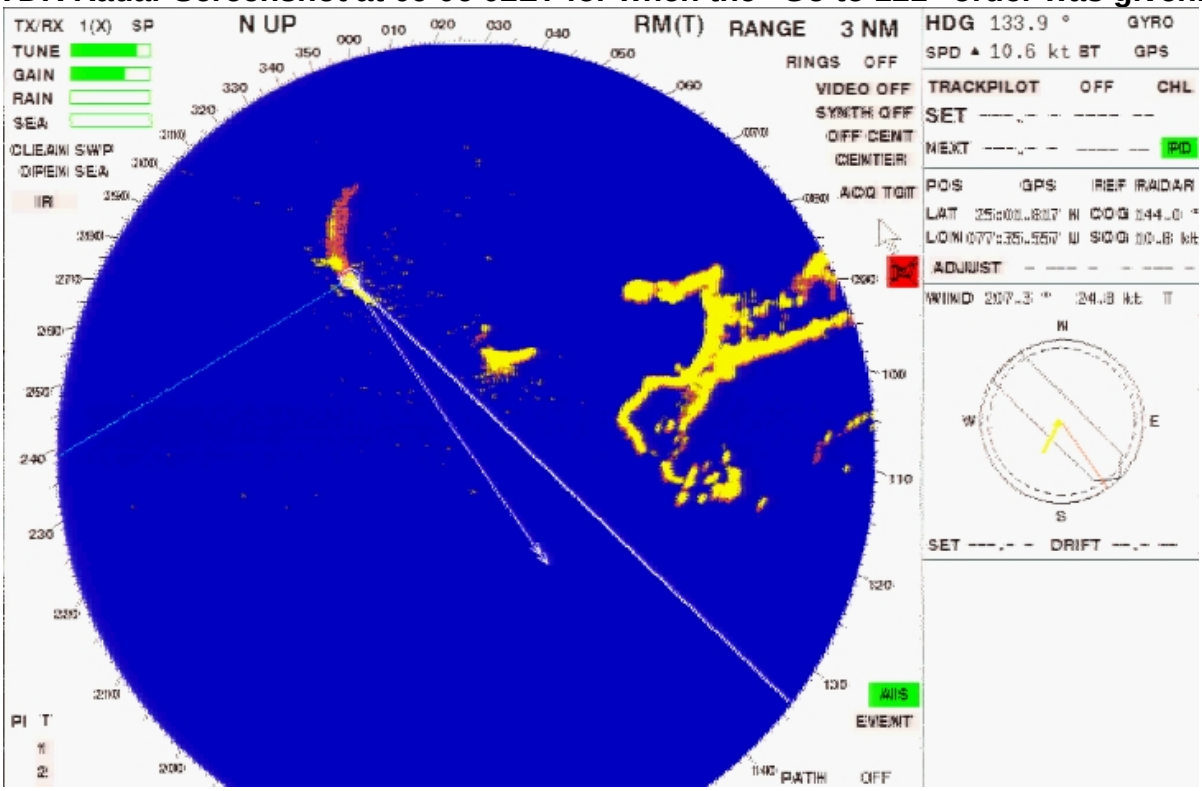
Annex 3C

VDR Radar Screenshot at 09 04 08LT for when the “Starboard 5” order was given.

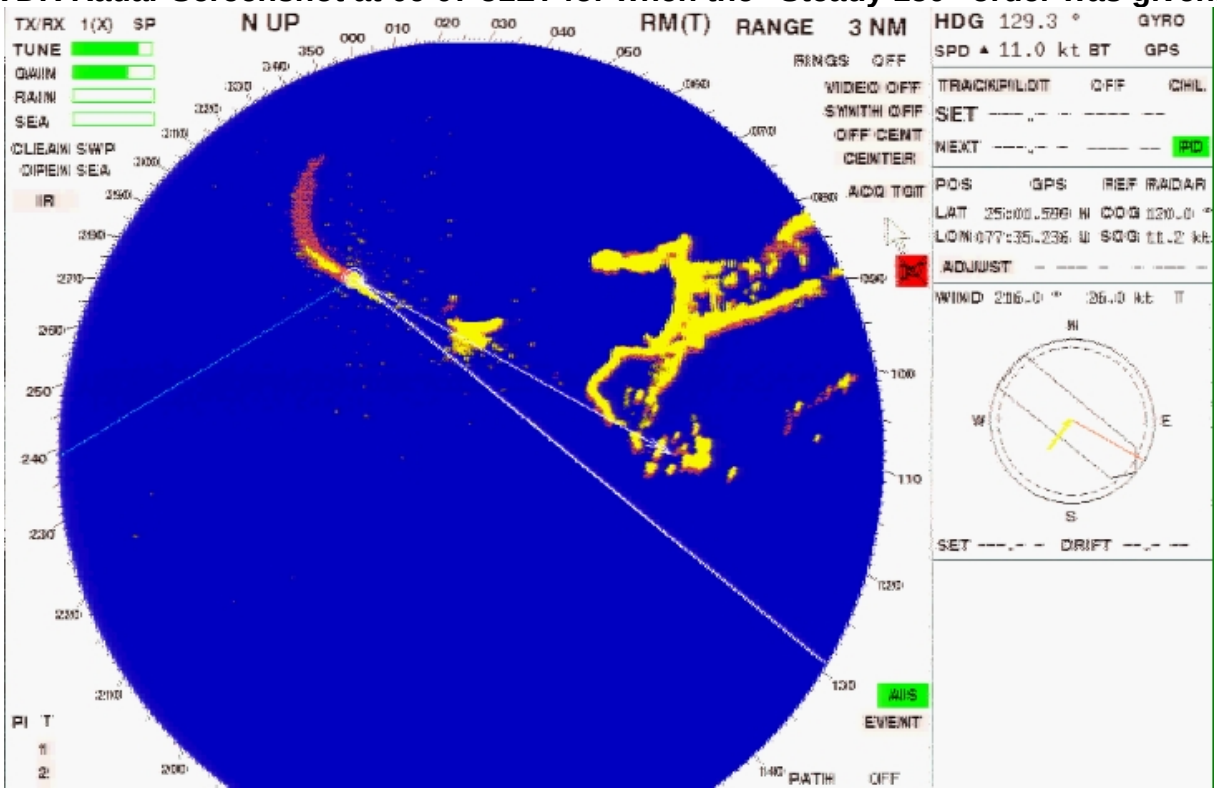


Annex 3D

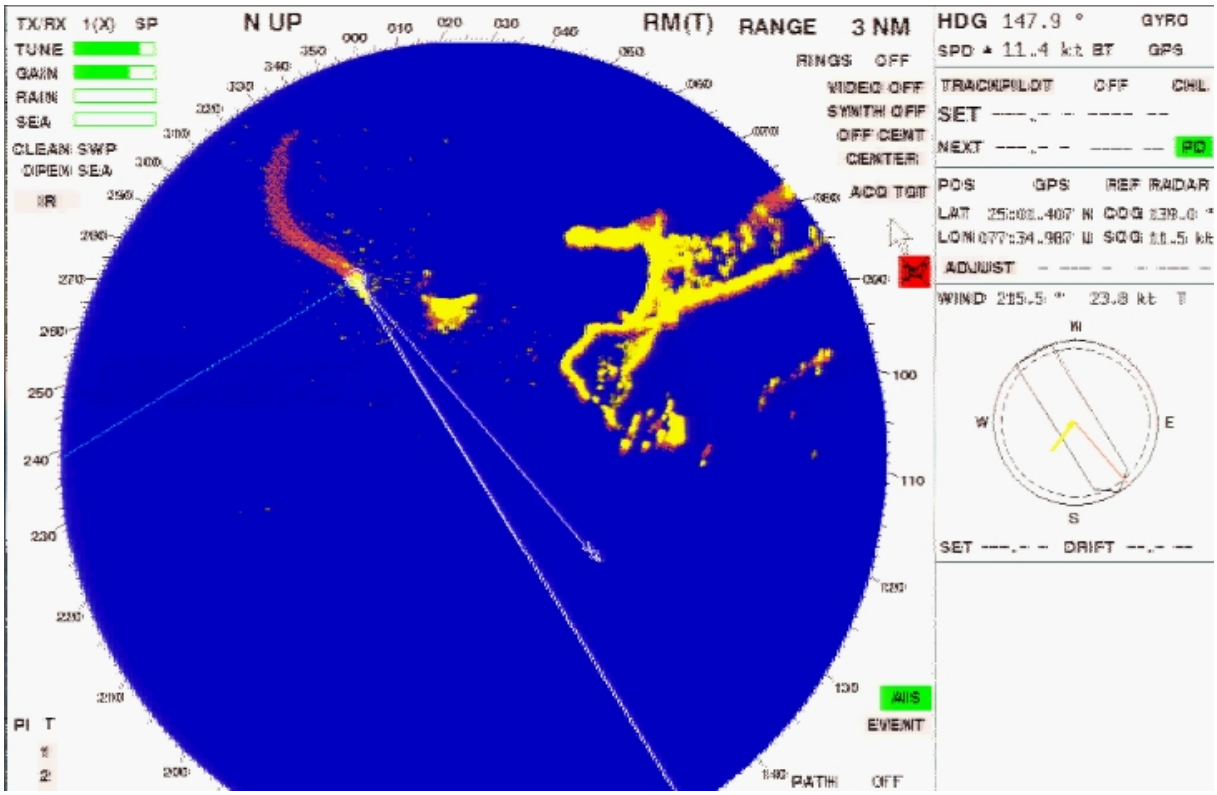
VDR Radar Screenshot at 09 06 02LT for when the “Go to 121” order was given.



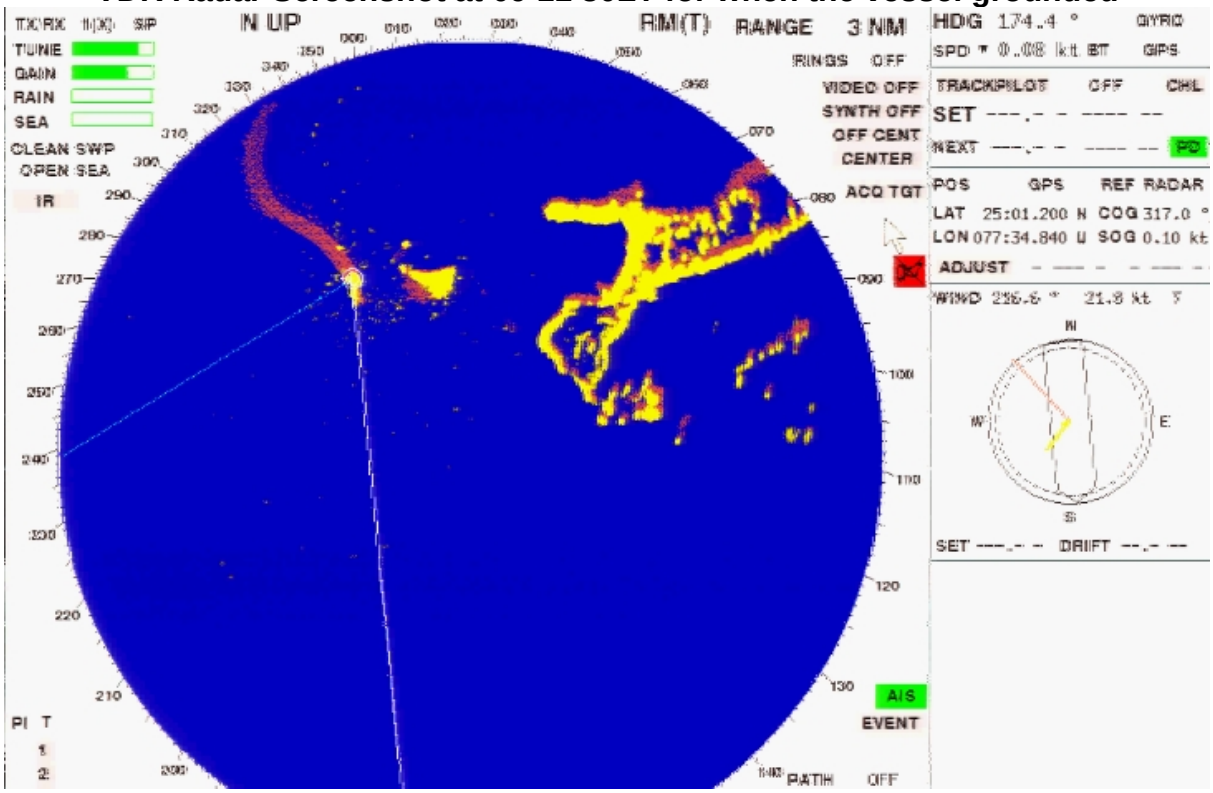
Annex 3E
VDR Radar Screenshot at 09 07 51LT for when the “Steady 150” order was given.



Annex 3F
VDR Radar Screenshot at 09 09 28LT for when the Helmsman states “150”

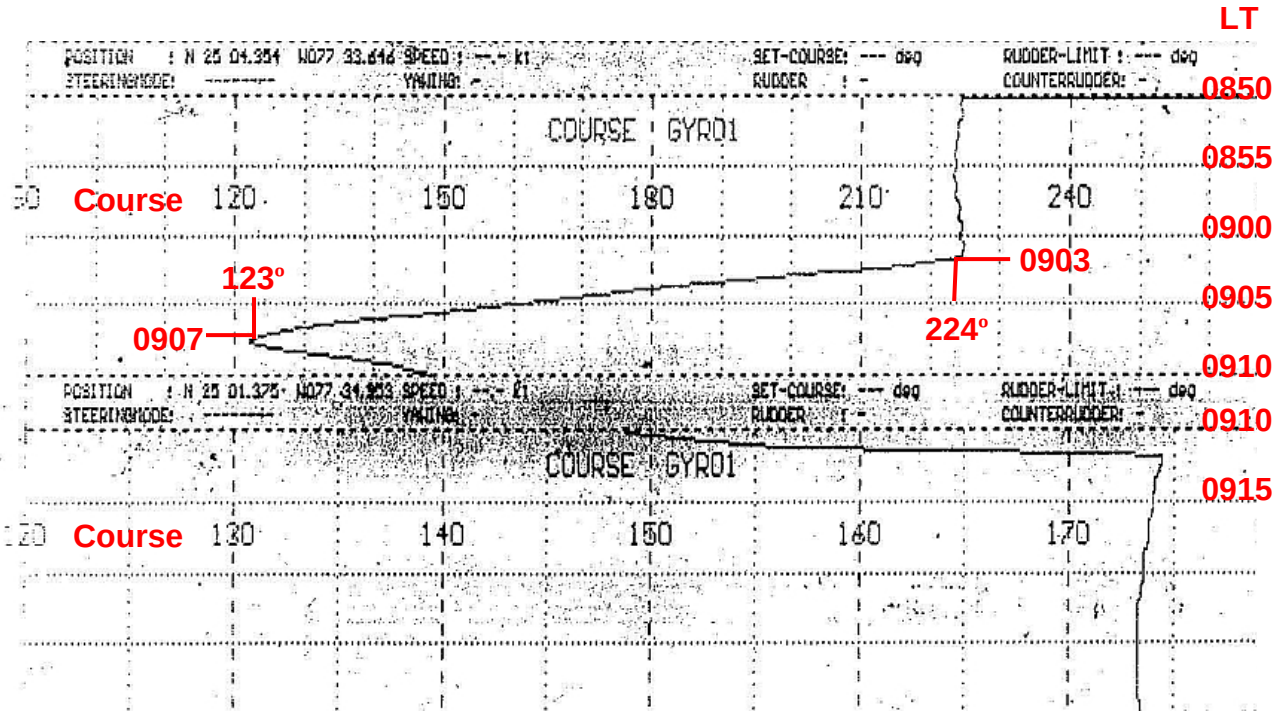


Annex 3G
VDR Radar Screenshot at 09 11 30LT for when the vessel grounded



Annex 4

The Course Recorder



The line representing the change of heading between 0903 and 0907 is approximately a straight line. During this period the change of heading is approximately 101° (224°-123°). Therefore the average rate of turn can be calculated as approximately 25°/min.

Please note that rate of turn at any one point may be higher or lower than 25°/min.

Annex 5

SOLAS Ch V/34.1 as adopted by Merchant Shipping Safety Of Navigation - SOLAS Chapter V Regulations[2]

IMO RESOLUTION A.893(21) adopted on 25 November 1999
GUIDELINES FOR VOYAGE PLANNING

1 Objectives

1.1 The development of a plan for voyage or passage, as well as the close and continuous monitoring of the vessel's progress and position during the execution of such a plan, are of essential importance for safety of life at sea, safety and efficiency of navigation and protection of the marine environment.

1.2 The need for voyage and passage planning applies to all vessels. There are several factors that may impede the safe navigation of all vessels and additional factors that may impede the navigation of large vessels or vessels carrying hazardous cargoes. These factors will need to be taken into account in the preparation of the plan and in the subsequent monitoring of the execution of the plan.

1.3 Voyage and passage planning includes appraisal, i.e. gathering all information relevant to the contemplated voyage or passage; detailed planning of the whole voyage or passage from berth to berth, including those areas necessitating the presence of a pilot; execution of the plan; and the monitoring of the progress of the vessel in the implementation of the plan. These components of voyage/passage planning are analysed below.

2 Appraisal

2.1 All information relevant to the contemplated voyage or passage should be considered. The following items should be taken into account in voyage and passage planning:

.1 the condition and state of the vessel, its stability, and its equipment; any operational limitations; its permissible draught at sea in fairways and in ports; its manoeuvring data, including any restrictions;

.2 any special characteristics of the cargo (especially if hazardous), and its distribution, stowage and securing on board the vessel;

.3 the provision of a competent and well-rested crew to undertake the voyage or passage;

.4 requirements for up-to-date certificates and documents concerning the vessel, its equipment, crew, passengers or cargo;

.5 appropriate scale, accurate and up-to-date charts to be used for the intended voyage or passage, as well as any relevant permanent or temporary notices to mariners and existing radio navigational warnings;

.6 accurate and up-to-date sailing directions, lists of lights and lists of radio aids to navigation; and

.7 any relevant up-to-date additional information, including:

.1 mariners' routeing guides and passage planning charts, published by competent authorities;

.2 current and tidal atlases and tide tables;

.3 climatological, hydrographical, and oceanographic data as well as other appropriate meteorological information;

.4 availability of services for weather routeing (such as that contained in Volume

[2] SD269/04

D of the World Meteorological Organization's Publication No. 9);
.5 existing ships' routeing and reporting systems, vessel traffic services, and marine environmental protection measures;
.6 volume of traffic likely to be encountered throughout the voyage or passage;
.7 if a pilot is to be used, information relating to pilotage and embarkation and disembarkation including the exchange of information between master and pilot;
.8 available port information, including information pertaining to the availability of shore-based emergency response arrangements and equipment; and
.9 any additional items pertinent to the type of the vessel or its cargo, the particular areas the vessel will traverse, and the type of voyage or passage to be undertaken.

2.2 On the basis of the above information, an overall appraisal of the intended voyage or passage should be made. This appraisal should provide a clear indication of all areas of danger; those areas where it will be possible to navigate safely, including any existing routeing or reporting systems and vessel traffic services; and any areas where marine environmental protection considerations apply.

3 Planning

3.1 On the basis of the fullest possible appraisal, a detailed voyage or passage plan should be prepared which should cover the entire voyage or passage from berth to berth, including those areas where the services of a pilot will be used.

3.2 The detailed voyage or passage plan should include the following factors:
.1 the plotting of the intended route or track of the voyage or passage on appropriate scale charts: the true direction of the planned route or track should be indicated, as well as all areas of danger, existing ships' routeing and reporting systems, vessel traffic services, and any areas where marine environmental protection considerations apply;
.2 the main elements to ensure safety of life at sea, safety and efficiency of navigation, and protection of the marine environment during the intended voyage or passage; such elements should include, but not be limited to:
.1 safe speed, having regard to the proximity of navigational hazards along the intended route or track, the manoeuvring characteristics of the vessel and its draught in relation to the available water depth;
.2 necessary speed alterations en route, e.g., where there may be limitations because of night passage, tidal restrictions, or allowance for the increase of draught due to squat and heel effect when turning;
.3 minimum clearance required under the keel in critical areas with restricted water depth;
.4 positions where a change in machinery status is required;
.5 course alteration points, taking into account the vessel's turning circle at the planned speed and any expected effect of tidal streams and currents;
.6 the method and frequency of position fixing, including primary and secondary options, and the indication of areas where accuracy of position fixing is critical and where maximum reliability must be obtained;
.7 use of ships' routeing and reporting systems and vessel traffic services;
.8 considerations relating to the protection of the marine environment; and
.9 contingency plans for alternative action to place the vessel in deep water or proceed to a port of refuge or safe anchorage in the event of any emergency necessitating abandonment of the plan, taking into account existing shore-based emergency response arrangements and equipment and the nature of the cargo and of the emergency itself.

3.3 The details of the voyage or passage plan should be clearly marked and recorded, as appropriate, on charts and in a voyage plan notebook or computer disk.

3.4 Each voyage or passage plan as well as the details of the plan, should be approved by the ships' master prior to the commencement of the voyage or passage.

4 Execution

4.1 Having finalized the voyage or passage plan, as soon as time of departure and estimated time of arrival can be determined with reasonable accuracy, the voyage or passage should be executed in accordance with the plan or any changes made thereto.

4.2 Factors which should be taken into account when executing the plan, or deciding on any departure therefrom include:

.1 the reliability and condition of the vessel's navigational equipment;
.2 estimated times of arrival at critical points for tide heights and flow;
.3 meteorological conditions, (particularly in areas known to be affected by frequent periods of low visibility) as well as weather routeing information;
.4 daytime versus night-time passing of danger points, and any effect this may have on position fixing accuracy; and
.5 traffic conditions, especially at navigational focal points.

4.3 It is important for the master to consider whether any particular circumstance, such as the forecast of restricted visibility in an area where position fixing by visual means at a critical point is an essential feature of the voyage or passage plan, introduces an unacceptable hazard to the safe conduct of the passage; and thus whether that section of the passage should be attempted under the conditions prevailing or likely to prevail. The master should also consider at which specific points of the voyage or passage there may be a need to utilize additional deck or engine room personnel.

5 Monitoring

5.1 The plan should be available at all times on the bridge to allow officers of the navigational watch immediate access and reference to the details of the plan.

5.2 The progress of the vessel in accordance with the voyage and passage plan should be closely and continuously monitored. Any changes made to the plan should be made consistent with these Guidelines and clearly marked and recorded.