Report on the investigation of

the close-quarters situation between the

ro-ro passenger ferry

Maersk Dover

the tanker

Apollonia

and the container vessel

Maersk Vancouver

in the Dover Strait

on 17 October 2006

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The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2005 – Regulation 5:

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AIS	-	Automatic Identification System
ARPA	-	Automatic Radar Plotting Aid
COLREGS	-	The Merchant Shipping (Distress and Prevention of Collisions) Regulations 1996
CPA	-	Closest Point of Approach
ECDIS	-	Electronic Chart and Display System
ETA	-	Estimated time of arrival
GMDSS	-	Global Maritime Distress and Safety System
grt	-	gross registered tonnage
GSMS	-	Global Ship Management System
ICS	-	International Chamber of Shipping
ILO	-	International Labour Organisation
LCD	-	Liquid Crystal Display
MGN	-	Marine Guidance Note
MHz	-	megahertz
MMS	-	Maersk Marine Services
nm	-	nautical mile
NARAS	-	Navigation Aids Radar and ARPA Simulation
OOW	-	Officer of the Watch
QM	-	Quarter Master
Racon	-	A radar transponder used to mark navigational hazards
SAT C	-	Two way satellite message communication system
SOLAS	-	Safety of Life at Sea
STCW	-	International Convention on Standards of Training, Certification and Watchkeeping, incorporating the 1995 amendments.
TSS	-	Traffic Separation Scheme
UTC	-	Universal co-ordinated time
VHF	-	Very High Frequency
VLCC	-	Very Large Crude Carrier
2/O	-	second officer

Maersk Dover

Apollonia

Maersk Vancouver

SYNOPSIS

All times are UTC.

At 0735 on 17 October 2006, the officer of the watch (OOW) onboard the ro-ro passenger ferry *Maersk Dover,* which was en route from Dover to Dunkerque, received a VHF radio call from a deep sea pilot onboard the tanker *Apollonia*, telling him that *Maersk Dover* was passing too close. At that time, the two vessels were 1.9nm apart and, until then, *Maersk Dover*'s OOW was unaware of *Apollonia'*s presence, 40º on his starboard bow. The situation was exacerbated by the presence of a third vessel, *Maersk Vancouver,* which was overtaking *Apollonia* on her port side*. Maersk Dover* was making 21 knots.

A close-quarters situation developed. *Maersk Dover* took last minute avoiding action, passing 5 cables ahead of *Maersk Vancouver* and 1 cable astern of *Apollonia*.

At 0714, the master of *Maersk Dover* had handed over the con to the oncoming OOW, the 2/O. They had both identified a suitable gap between two groups of vessels prior to crossing the south-west traffic lane and, using the port ARPA display, the 2/O had acquired relevant contacts transiting that lane. Visibility was 4-5nm. A QM was employed continuously on the bridge, and at sea he was nominated as the dedicated lookout. However, on this occasion he had been allowed to continue cleaning the bridge, a task he had commenced earlier that morning while the vessel was alongside at Dover.

At 0726, a SAT C alarm sounded at the rear of the bridge. The 2/O investigated and, believing that the commercial message was important, telephoned the master to brief him on its content. He sat on the footrest of the port bridge chair to make the call and, as a consequence, his view through the wheelhouse window was considerably restricted. He finished talking to the master 5 minutes later, and then proceeded to fix the vessel's position before making a VHF radio call to Dunkerque Port.

The VHF radio call from *Apollonia*'s pilot alerted the 2/O to the presence of the two vessels close on his starboard bow, by which time there had been no proper lookout maintained on the bridge of *Maersk Dover* for nearly 9 minutes.

The 2/O initially made a succession of small alterations of course to starboard using the automatic pilot, but then requested the QM to begin hand steering to manoeuvre between the two vessels. The QM was not given a helm order, or a course to steer, and instead was given broad directions on what he should do. During the manoeuvre, the 2/O noticed that neither vessel was showing on the port radar display.

Only when the 2/O overheard a VHF radio call between *Apollonia*'s pilot and Dover coastguard, did he inform *Maersk Dover*'s master of the incident. The master went to the bridge and, on examining the port radar display, found the automatic tuning facility was not operating correctly. By twice reverting to manual tuning, the radar picture was eventually recovered.

This was the second close-quarters situation that *Maersk Dover* had been involved in since it started cross-Channel operations in August 2006. Some of the contributory factors were common to both incidents.

Standard practice was for the master to hand over the watch to the OOW before the vessel altered course to cross the traffic separation scheme; he would then leave the bridge. Handing over at this position, particularly at night, gave the OOW little time to become fully acquainted with the traffic and navigational situation. Had the master remained on the bridge for longer, he could have provided support and advice to the OOW, and would have been better placed to monitor his performance. He might then have queried the OOW's level of experience and expertise, and doubled-up on the watch until he had achieved the necessary competence.

Although there was a QM on the bridge, available for lookout duties, poor bridge management had allowed him to become involved in other, inappropriate tasks. The situation was exacerbated when the OOW became unnecessarily distracted by the SAT C message and the conversation that followed with the master. When the OOW sat on the footrest of the bridge chair, there was no-one keeping either a radar or a visual lookout on the bridge.

Common to both incidents was the speed with which the close-quarters situation developed. The speeds of the vessels involved were in excess of 20 knots, leaving little time to take avoiding action. The OOW's ability to detect, evaluate, and then take effective action was seriously compromised by his lack of attention to, and distractions from, his watchkeeping duties.

Maersk Marine Services has been recommended, for its cross-Channel ferry operations, to:

- Introduce procedures to ensure that before OOWs keep their first unsupervised watch: they have been assessed by the master to confirm they are fully competent to keep a safe navigation watch; and have been fully trained and locally assessed on type specific bridge equipment.
- Identify sources of distraction for bridge watchkeepers, and introduce measures to minimise these. Such measures should include procedures for handling routine commercial message traffic away from the bridge.
- Review the tasks and workload of masters, to allow them to spend as much time on the bridge as circumstances require.
- In light of the increasing speed of ferries and of transiting traffic in the Dover Strait, and in view of the enhanced arrangements utilised by high speed ferries, risk assess the route to determine the optimum arrangements for the maintenance of safe navigation.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *MAERSK DOVER* AND ACCIDENT

Vessel details

Registered owner	:	Norfolkline BV
Manager	:	Maersk Marine Services
Port of registry	:	Dover
Flag	:	British
Type	:	Ro-ro passenger
Built	:	2006 South Korea
Classification society	:	Lloyd's Register
Construction	:	Steel + 100A1
Length overall	:	186.65m
Gross tonnage	:	35923.0
Engine power and type	:	38400.0kW MAN B&W
Service speed	:	26.0 knots
Other relevant info	:	Twin screw, controllable pitch propellers, independent becker rudders, three bow thrusters and one stern thruster.

Incident details

Time and date	:	0735 UTC 17 October 2006
Location of incident	:	51º 05'.4N 001º 40'.7E. Dover Strait north-east traffic lane.
Persons on board	:	64 crew and 135 passengers.
Injuries/fatalities	:	None
Damage	:	None
Other relevant info	:	Time of sunrise 0620 UTC 17 October 2006

1.2 PARTICULARS OF *APOLLONIA*

Vessel details

Registered owner	:	Apollonia Transportation ENE
Manager	:	Neda Maritime Agency Co Ltd
Port of registry	:	Piraeus
Flag	:	Greece
Type	:	VLCC
Built	:	2003 South Korea
Classification society	:	American Bureau of Shipping
Construction	:	Steel
Length overall	:	333.28m
Gross tonnage	:	160,904
Engine power and type	:	MAN B&W 24812.0kW
Service speed	:	15.9 knots

1.3 PARTICULARS OF *MAERSK VANCOUVER*

Vessel details

Registered owner	:	Kartik Schiffsbetriebs GmbH & Co ms 'Vancouver' KG
Manager	:	V Ships Germany
Port of registry	:	Gibraltar
Flag	:	Gibraltar
Type	:	Container ship
Built	:	2001 Hamburg
Classification society	:	Germanischer Lloyd
Construction	:	Steel
Length overall	:	178.57m
Gross tonnage	:	17189.0
Engine power and type	:	B & W 16980.0kW
Service speed	:	21.2 knots
Other relevant info	:	Forward thruster 900kW. Aft thruster 600kW.

1.4 BACKGROUND

1.4.1 Development of the present cross-Channel service

Prior to Norfolkline taking over, the Dover to Dunkerque ro-ro passenger ferry route was operated by vessels from the Norse Merchant Group. These were managed by Meridian Ship Management, and manned by personnel recruited by Dobson Fleet Management. The Norse Merchant Group was taken over by Norfolkline, a wholly owned subsidiary of AP Moller Maersk, in 2005.

Norfolkline initially chartered three Norse Merchant Group vessels, until the three new purpose-built vessels they had under construction were delivered. In November 2005, the first Norfolkline vessel, *Maersk Dunkerque,* entered service replacing *Dawn Merchant*. In February 2006, the second new vessel *Maersk Delft* replaced *Northern Merchant,* and in July 2006 *Maersk Dover* replaced *Midnight Merchant.*

The new vessels increased freight carrying capacity on the Dover to Dunkerque route by 25 percent, and in 2006 the port of Dunkerque achieved a record cargo throughput of 56.65 million tonnes. Further growth was expected in 2007, the first full year of operation of the three new vessels.

1.4.2 Ship management

The takeover by Norfolkline in 2005 saw ship management responsibilities and personnel management for the ships operating between Dover and Dunkerque, transfer to Maersk Marine Services (MMS), the UK arm of AP Moller Maersk. The new managers scrutinised the future manning requirements of the new vessels, and identified which existing Norse Merchant Group personnel would transfer across to the new Norfolkline vessels. The manning shortfall was filled by direct outside recruitment through a group manning agency.

1.4.3 The service route

The Dover to Dunkerque route is a total distance of 37 miles, en route crossing the Dover Strait traffic separation scheme (TSS). The Dover Strait is one of the world's busiest shipping lanes with, on average, 400 vessels transiting through, and 100 crossing ferry movements each day. The Norfolkline service provided twelve return crossings per day.

At the time of this incident, *Maersk Dover'*s crossing was scheduled to take 1 hour and 45 minutes from berth to berth, at a speed of 21 knots. The voyage passage plan can be found at **Annex A**.

1.5 MANNING

1.5.1 Complement

Maersk Dover was complemented with a deck department consisting of:

- Two masters
- One chief officer
- One first officer
- Two 2/Os
- One third officer

1.5.2 Work routine

The crew on *Maersk Dover* worked a system of 2 weeks onboard the vessel followed by 2 weeks leave. Other than for absence because of sickness, the routine did not vary.

The work routine was based on 12 hour periods of duty. At senior level, the vessel's complement enabled dual watch operations to be maintained continuously by both masters and a chief / first officer. Bridge watchkeeping was carried out by two 2/Os and one 3/O, who were each contracted to work 12 hours per day. The duty consisted of 8 hours bridge watchkeeping while on passage and cargo operations when in port, on completion of which the officer was relieved. The remainder of the 12 hour period was spent carrying out administrative duties including correcting navigation publications and updating electronic software for the bridge equipment. If the work was completed ahead of time, it was possible for the officer to take additional rest or recreation time.

Senior and junior officers' watch times were deliberately staggered to try and ensure a seamless transition during changeovers. During a 2 week period onboard, watches were rotated between equivalent ranks to ensure equal day / night work periods and, at the end tours of duty, the relief changeover date was also staggered to avoid making large changes of personnel at the same time.

On the morning of 17 October, the master had started his 12 hour period of duty at 0600. The 2/O had commenced his 12 hour period of duty 1 hour earlier, at 0500.

1.5.3 Previous experience

Master

The duty master at the time of the incident had a total of 23 years experience operating on ferries, and 10 years experience working ashore in port operations and as a marine superintendent. After working ashore, he had returned to sea and joined a ferry company as chief officer. At this time, he held a former class two (first mate's) certificate of competency. Three years before the incident, after applying for a position through Dobson Fleet Management, he was employed as chief officer on Norse Merchant Line ferries. In March 2002, he revalidated his certificate of competency under the requirements of STCW 95. Having obtained an NARAS certificate at management level, he was issued with an STCW II/2 certificate of competency to sail as master of vessels less than 3000grt in the unlimited area, or of any vessel in the near coastal area.

Having been identified by MMS as a potential master, he was subsequently offered the position of master with Norfolkline Ferries in April 2005. Although his certificate was invalid for *Maersk Dover*'s delivery voyage from Korea to Dover, he accompanied the vessel's other master and started gaining knowledge and experience of the vessel. With 5 years prior experience of Dover Strait ferry operations, he was one of the company's more experienced masters.

2/O

The 2/O was an ex-Maersk Line deck cadet, who had left the company early in 2001 shortly after gaining his STCW 2/I certificate of competency. After leaving Maersk Line, he worked on various vessels and gained 5 years' ferry operating experience on several of the Irish Sea routes. Recruited from outside the company, he joined Norfolkline in May 2006 as a 2/O. He joined *Maersk Dover*, his first Norfolkline vessel, on 8 July 2006 at

Port Suez, Egypt, on her delivery voyage to Dover. After the initial 25 day appointment in July, this was his third 2-week tour of duty. He had joined the vessel on 15 October 2006, 4 days later than scheduled, due to a minor illness that did not require medication.

Quartermasters (QMs)

Two specialist deck rating QMs each work 12 hour rosters on the bridge. Employed as a QM since June 2006, the QM on watch at the time of the incident was a fully qualified 'rating forming part of a navigation watch', a qualification that had been issued in March 2005.

1.6 TRAINING

Before joining *Maersk Dover* for the first time, MMS sent the master and 2/O to Denmark to attend a 3 day Furuno bridge equipment course. This was designed to familiarise officers with the full suite of navigation and communications equipment that they would be expected to use onboard.

Two weeks before the Furuno bridge equipment course, the 2/O had attended a crew resource management course intended for new staff joining the company, and a team resource management course aimed specifically at those about to join *Maersk Dover*.

The QMs received onboard, type equipment training, arranged by MMS, but there was no certificate or documentation to support the quality and quantity of training undertaken.

1.7 BRIDGE DESIGN

1.7.1 Overview

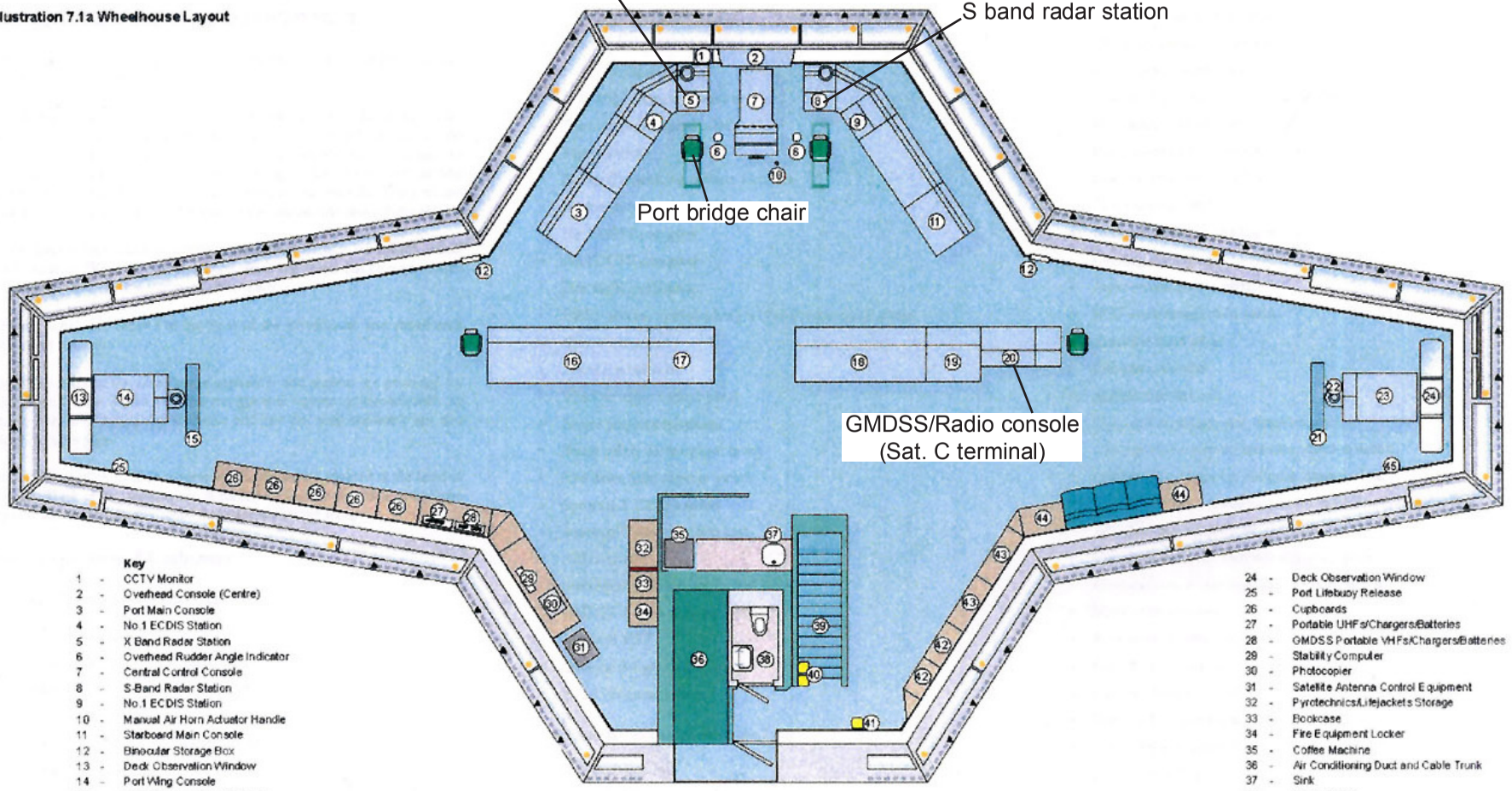
Guidance on the regulations for bridge design can be found in SOLAS Chapter V, regulation 15. Sub paragraph 6 of the regulation aims to:

> '*prevent or minimize excessive or unnecessary work and conditions or distractions on the bridge which might cause fatigue or interfere with the vigilance of the bridge team and the pilot'*

The bridge design of *Maersk Dover* can be seen in **Figure 1**. It followed traditional 'modern' bridge design for vessels trading worldwide in international waters. The comprehensive suite of equipment allowed two operators to sit either side of a centreline console which contained helm, main engine and thruster controls, and various multi-functional instrument readout displays. Directly ahead of, and slightly to one side of each chair, were individual ARPA radar and ECDIS displays.

An operator sitting in either bridge chair had a panoramic view over an arc of the horizon of about 330 degrees. Each chair was capable of being fully adjusted for height and distance from the console. A footrest was provided on each chair.

Illustration 7.1a Wheelhouse Layout



Key

1 - CCTV Monitor
2 - Overhead Console (Centre)
3 - Port Main Console
4 - No.1 ECDIS Station
5 - X Band Radar Station
6 - Overhead Rudder Angle Indicator
7 - Central Control Console
8 - S-Band Radar Station
9 - No.1 ECDIS Station
10 - Manual Air Horn Actuator Handle
11 - Starboard Main Console
12 - Binocular Storage Box
13 - Deck Observation Window
14 - Port Wing Console
15 - Port Wing Overhead Console
16 - Navigation Console - Equipment
17 - Navigation Console - Chart Area
18 - Safety Console
19 - Safety Console - CCTV Area
20 - GMDSS/Radio Console
21 - Starboard Wing Overhead Console
22 - Gyrocompass Repeater
23 - Starboard Wing Console
24 - Deck Observation Window
25 - Port Lifebuoy Release
26 - Cupboards
27 - Portable UHFs/Chargers/Batteries
28 - GMDSS Portable VHFs/Chargers/Batteries
29 - Stability Computer
30 - Photocopier
31 - Satellite Antenna Control Equipment
32 - Pyrotechnics/Lifejackets Storage
33 - Bookcase
34 - Fire Equipment Locker
35 - Coffee Machine
36 - Air Conditioning Duct and Cable Trunk
37 - Sink
38 - Bridge Toilet
39 - Stairway Down
40 - SARTs
41 - EPIRB
42 - Cupboards
43 - Public Address/MCOS Racks
44 - Cupboards
45 - Starboard Lifebuoy Release

Electric Heated Glass
Sunblind Location
Window Wiper

Figure 1

1.7.2 Radars

Two Furuno FAR 2817 - 23 inch colour LCD ARPA radar displays were fitted, one either side of the centreline console:

- Port display was for the X Band (9410 MHz) wavelength 3cm radar.
- Starboard display was for the S band (3050 MHz) wavelength 10cm radar.

In addition, radar information was integrated to the ECDIS displays.

Both radar displays were type approved, complying with statutory minimum requirements and providing the operator with numerous additional features. The operator's handbook contained 250 pages of information. Included with the handbook was a 4 page compact user guide that provided instructions for carrying out basic operating functions on the equipment.

The VDR fitted to *Maersk Dover* required a radar picture input facility. This had been achieved by interfacing the starboard display (S Band radar) to the VDR. A previous incident between two Norfolkline vessels (see paragraph 1.13), had highlighted that if the operator was using the port radar display at the time of an incident, then the radar picture data captured by the VDR did not necessarily reflect the picture in use by the operator. To ensure meaningful radar data was recorded by the VDR, the company had therefore instructed watchkeeping officers to use the starboard radar.

Onboard *Maersk Dover*, it was normal routine for the master to use the starboard radar. In his absence, use of the starboard radar by the OOW ensured that an up-to-date picture was available for the master when he arrived on the bridge.

AIS was not interfaced to the radars, therefore the information was not available to the operator while keeping a radar watch. AIS had, however, been integrated into the ECDIS display, adjacent to the radar, and so was available to the OOW at the time of this incident.

1.7.3 SAT C communications equipment

Although *Maersk Dover* was operating in GMDSS sea area A1 – within range of shore-based VHF stations – she had been fitted with radio equipment to operate in sea area 3. The nominated GMDSS operator was the OOW, and the GMDSS communications equipment, which included the SAT C terminal, was fitted on the bridge in the starboard aft console. SAT C consists of two-way data messaging equipment that is a mandatory requirement for SOLAS vessels operating in sea area A3. In addition to its GMDSS functions, the terminal onboard was used for commercial correspondence.

1.8 NARRATIVE

(All times are UTC, obtained from *Maersk Dover*'s voyage data recorder.)

1.8.1 *Maersk Dover* – departure from Dover

On 17 October 2006 at 0655, *Maersk Dover* went to 'harbour stations' and proceeded to let go all lines before departing from ED3 berth in Dover. Bound for Dunkerque, the vessel was carrying 64 crew, 135 passengers, 75 freight vehicles and 26 cars. The QM had been cleaning the bridge, but at 'harbour stations' he commenced operating

the starboard ARPA radar display, acquiring contacts proceeding along the south-west traffic lane of the Dover Straits TSS. This was a standard procedure that assisted the bridge team to gain an early assessment of the traffic situation during and after departure.

On the bridge for the vessel's departure from Dover were the master, mate and QM. The master was conning the vessel, the mate was in charge of berthing communications, and the QM was fully integrated into the bridge organisation fulfilling the role of bridge administrator. The 2/O was the officer-in-charge on the aft mooring deck for departure. It was normal practice for an officer to take charge of the mooring station secured to the shore link span, while a petty officer took charge of the remaining station.

At 0700, when the master had manoeuvred *Maersk Dover* clear of ED3, the mate ordered the fore and aft stations to stand down. The thrusters were turned off, and the master transferred manual steering from the bridge wing console to the QM at the centreline console. The true course was set at 095ºT to pass through the eastern entrance of the breakwater.

At 0702, the master informed the engine room that two engines would be required for the crossing, and then told the chief officer that he could stand down from the bridge. This was followed seconds later by a report from the boatswain that the forecastle was all secure.

Meanwhile, the 2/O made his way from the aft mooring station to the bridge via the main car deck and the accommodation, arriving on the bridge at 0706. Once on the bridge, the 2/O started to familiarise himself with the shipping situation by observing the port side ARPA radar display.

1.8.2 Master / OOW handover

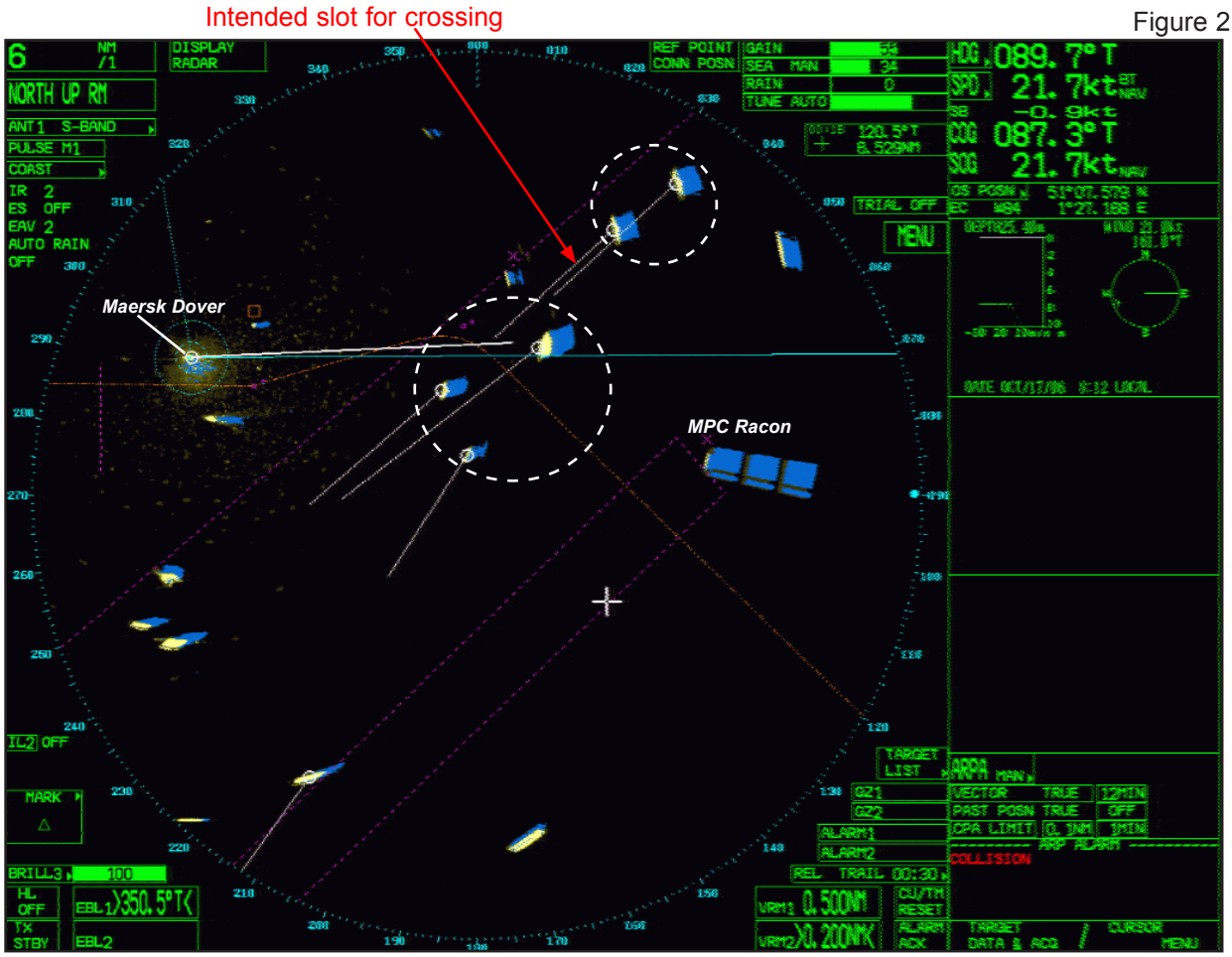
While the 2/O familiarised himself with the shipping plot and acquired contacts in the south-west lane of the TSS, he and the master conversed at length about the industrial action being taken by another ferry company's employees. They also spoke about the business development of Norfolkline in Eastern Europe. *Maersk Dover* was steering 090ºT at 21.6 knots.

At 0713, 5 cables from the South Goodwin Buoy, the master started handing over the watch to the 2/O by discussing contacts that he had acquired on the starboard ARPA radar. This display was set to the 6 mile range scale, north up, and off centred to the top left. Having identified a 'slot' between two groups of vessels transiting the south-west bound lane, his intention was for *Maersk Dover* to cross the traffic lane by passing astern of a group of three vessels and ahead of another group of two **(Figure 2)**.

The master concluded the handover by confirming that two steering motors were operating, two engines were running, the vessel was steering 095ºT by automatic pilot, and the tide was running with the vessel all the way to Dunkerque. At 0714, the master handed over the conduct of navigation to the 2/O.

While the officers were handing over, the QM had continued with cleaning the bridge, a task that he had begun while alongside in Dover.

Figure 2



1.8.3 Crossing the south-west lane

The 2/O continued to monitor the port radar display. He recalled changing between the 6 and 12 mile range scales, and believed the display was set to relative motion, centred, and north up. He had not detected any approaching vessels in the north-east bound lane.

At 0716, the 2/O made the first in a sequence of small course alterations, preparing to enter and then cross the south-west traffic lane, as discussed earlier with the master. The courses steered during this period were as follows:

0713	Course 095ºT
0716	a/c 100ºT
0720	a/c 110ºT
0721	a/c 125ºT

Between 0715 and 0726, the OOW and QM identified a large tanker proceeding along the south-west lane, and noted that *Maersk Delft*, another company ferry, was late arriving at the MPC buoy, but otherwise they maintained a fairly continuous, casual conversation.

At 0726 an alarm sounded at the rear of the bridge on the port side. The 2/O was not familiar with the alarm and went to investigate it, believing that it might be associated with the GMDSS. The alarm was accepted, at which time *Maersk Dover* was crossing the south-west bound lane, 2.2nm from the MPC buoy **(Figure 3)**, and *Apollonia* and *Maersk Vancouver* were 5.0nm on her starboard bow.

At about the same time as the alarm sounded, a printer unit became operational at the rear of the bridge. The 2/O ascertained that the alarm was designed to alert an operator to the receipt of a SAT C message, and subsequently acknowledged it. Still positioned at the rear of the bridge, the 2/O walked over to the printer and read the message that had been received from the Maersk technical branch in Copenhagen **(Annex B)**.

Shortly after 0728, in the belief that this was an important message, the 2/O telephoned the captain to discuss its content. He made the call using the telephone adjacent to the port ARPA radar and ECDIS. As he started the call, the 2/O was still unaware of the two approaching vessels: *Maersk Vancouver* 50º to starboard at 4.2nm, and *Apollonia* 40º to starboard at 4.1nm.

The QM vaguely recalled seeing two vessels in the north-east bound lane while he was cleaning the bridge, but did not report them to the OOW. Throughout the telephone call with the master, the 2/O remained sitting on the footrest of the port bridge chair. The conversation with the master was completed at 0731, and at this time the 2/O altered course 5º to starboard having regained the navigation track **(Figure 4)**. *Maersk Vancouver* and *Apollonia* were now at 3.0 and 3.2 miles respectively. Throughout this sequence of events, the QM continued cleaning the bridge.

1.8.4 Development of the close-quarters situation

The 2/O recalled that he stood up from the chair footrest and faced the port bridge wing. He noted that *Maersk Dover* had just passed the MPC buoy, a key point of the passage which was routinely recorded on the voyage checklist. The 2/O obtained the position by taking a radar bearing and distance of the MPC racon response, using the port ARPA display on the 12 mile range scale. The position was entered on the voyage checklist at 0732, by the QM, who then continued cleaning the bridge. The record shows that at 0732, the MPC buoy was bearing 032ºT at 1.3nm. *Maersk Vancouver* and *Apollonia* had closed to a distance of 2.5nm and 2.7nm, with speeds of 21 and 16 knots respectively **(Figure 5)**, but both the 2/O and the QM were still unaware of the developing close-quarters situation.

In accordance with the passage plan, the passing of the MPC buoy signified that there was 1 hour of the voyage remaining before the vessel's arrival at Dunkerque West. Consequently, at 0732.5, the 2/O commenced calling Dunkerque West (port control) to report the vessel's ETA. He made two transmissions using the port VHF radio, without receiving a reply. The QM confirmed that the VHF channel 73 was selected, and the 2/O made a further call to Dunkerque West at 0733.5, which was acknowledged, and informed them that *Maersk Dover* would be arriving in 1 hour. The QM continued cleaning the bridge **(Figure 6)**. At 0733.5 a call from *Apollonia* to *Maersk Dover* was not heard by either the OOW or the lookout.

1.8.5 The close-quarters situation

At 0734, *Maersk Dover* had started crossing the north-east bound lane when the 2/O heard the second VHF radio call, on channel 16, from the tanker *Apollonia.* After some confusion, while both vessels changed to VHF channel 77, communications were established 1 minute later. By this time, *Apollonia* had closed to a range of 1.9nm, and *Maersk Vancouver* was closer at 1.6nm. The deep sea pilot embarked in *Apollonia* confirmed his vessel's position relative to *Maersk Dover,* and added *'you are passing too close'*. The conversation prompted the 2/O to look out of the starboard forward facing bridge windows and, for the first time, register the presence of *Apollonia,* a vessel

Figure 3

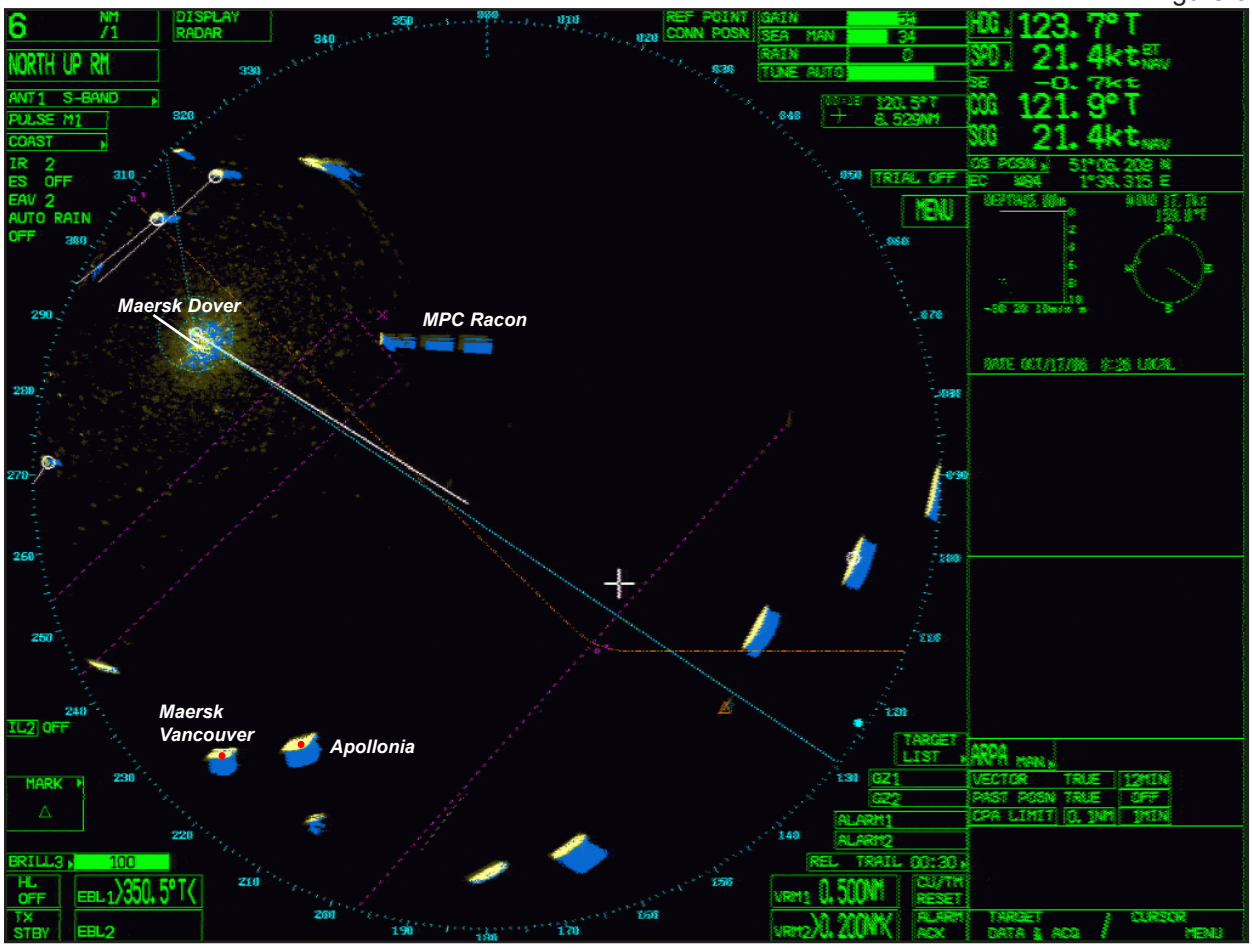


Figure 4

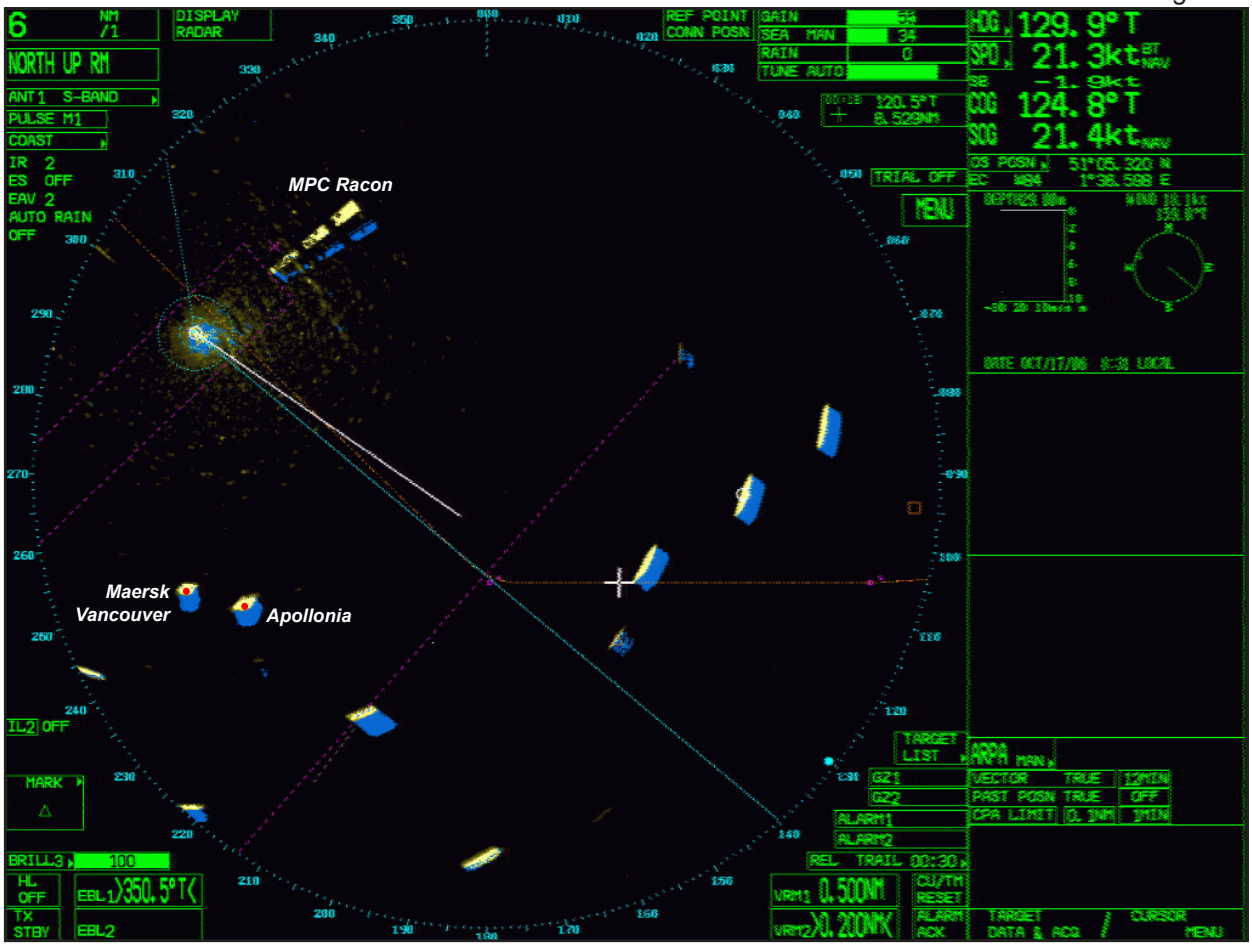


Figure 5

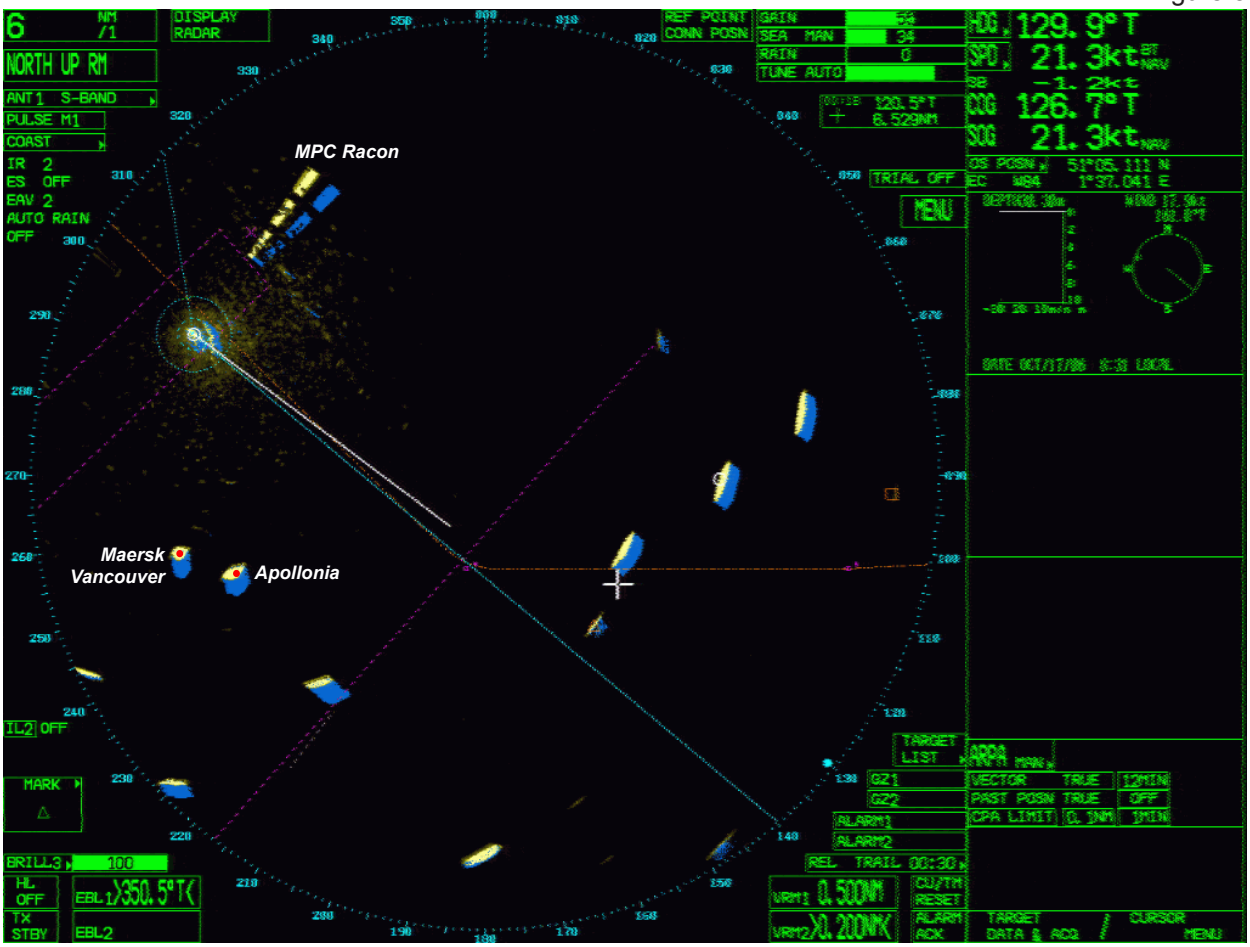
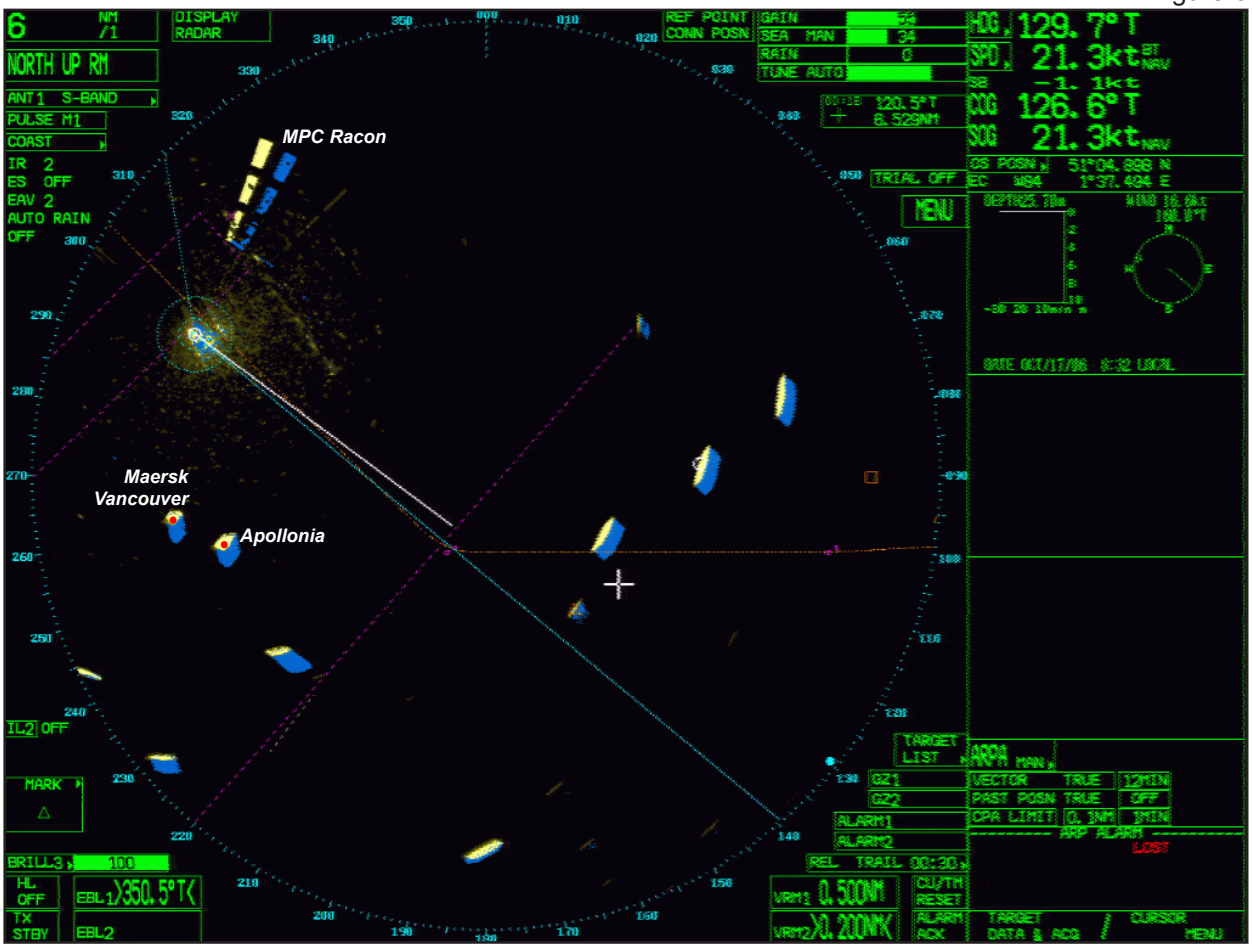


Figure 6



constrained by her draught and exhibiting a black cylinder in accordance with Rule 28 of the COLREGS. He also saw *Maersk Vancouver*, which was overtaking *Apollonia* on her port side. The VDR voice recording confirmed the 2/O's shock when he saw *Apollonia* for the first time.

As a precautionary measure, and unbeknown to the bridge team on *Maersk Dover*, the pilot onboard *Apollonia* called Dover Coastguard and asked them to observe the developing situation.

The 2/O called *Apollonia* by VHF radio, stating that he was altering course to starboard. He then commenced a succession of small alterations of course to starboard. Onboard *Apollonia,* the deep sea pilot believed that initially *Maersk Dover* made a small alteration of course to port and, as a result, ordered 10º of starboard helm to begin a slow turn to starboard. This measure was designed to allow an emergency full turn to be carried out, if required.

At about the same time, the master of *Maersk Vancouver*, which was proceeding at 21 knots, had determined that *Maersk Dover* would just pass clear ahead. As a precaution, he sounded 5 short blasts on the ship's whistle to indicate that he did not believe that *Maersk Dover* was taking sufficient action to avoid a close-quarters situation. He was unable to alter course to port because of the presence of *Maersk Dover*, and he was unable to alter course to starboard because he was overtaking *Apollonia*. He had, however, determined by radar and visual observations that without taking any further action, a collision could be avoided.

Neither *Apollonia*'s black cylinder nor *Maersk Vancouver*'s sound signal was registered on the bridge of *Maersk Dover*.

1.8.6 Action taken by *Maersk Dover* to avoid a close-quarters situation

Within 25 seconds of receiving the VHF call from *Apollonia,* the 2/O had visually assessed that *Maersk Vancouver* would pass safely to starboard and that, in any event, it was too late to alter course and pass around her stern. At 0737.7 the 2/O, clearly shaken by the developing situation, twice asked the QM to take the wheel. Manual helm was engaged at 0737.8.

Once hand steering had been engaged, the 2/O instigated avoiding action. His intention was to pass ahead of *Maersk Vancouver*, then alter course to starboard to pass between both vessels, and finally alter course to port to pass around *Apollonia'*s stern.

The manoeuvre was ordered informally by the 2/O and executed by the QM using his own interpretation. There was no helm order or course to steer given, and the manoeuvre consisted of course alterations only. The QM was given relative headings which related to steering ahead or astern of *Maersk Vancouver* and *Apollonia*. Midway through the manoeuvre, the 2/O noted that *Maersk Vancouver* was not showing on his radar display.

Execution of the action was captured by the VDR:

2/O - Mate (QM) just come round, astern of him will you.

QM - Yea, astern of the one just …

2/O - You see the Maersk one?, come ahead of him and astern of him, but don't go too close to him.

QM	-	*Wait 'til I get round here is that alright?*
2/O	-	*Mate (QM) no, just keep to port now.*
2/O	-	*He ain't on my radar him, that Maersk ship (Maersk Vancouver), now just keep steady, steady as you are, steady as you are.*
QM	-	*Steady steady steady, coming steady alright, nothing happened go round him.*
2/O	-	*Yea, I'm gunna wait til he's about there.*
2/O	-	*Right, come round to starboard now.*
QM	-	*Right, coming round to starboard now.*
2/O	-	*Don't make it too obvious for the old thingy-me-bob*

The VDR indicated that the bridge of *Maersk Dover* passed 5 cables ahead of *Maersk Vancouver,* resulting in a CPA of 3 cables on her starboard bow. This was followed, seconds later by closing *Apollonia* to 3 cables on the port bow, 2.5 cables on the port beam, and finally a CPA of 1 cable astern **(Figures 7, 8, 9, 10, 11)**.

Figure 7

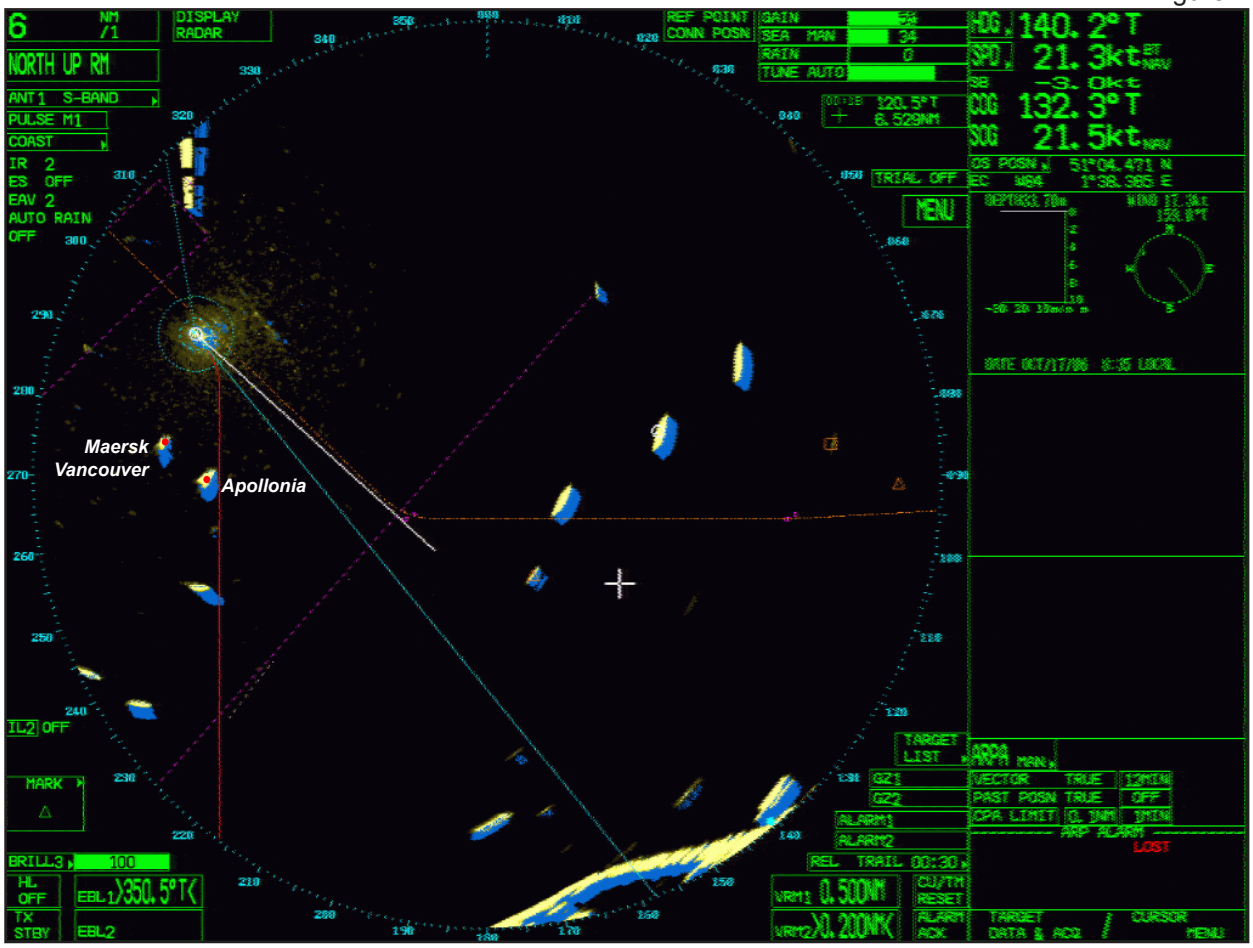


Figure 8

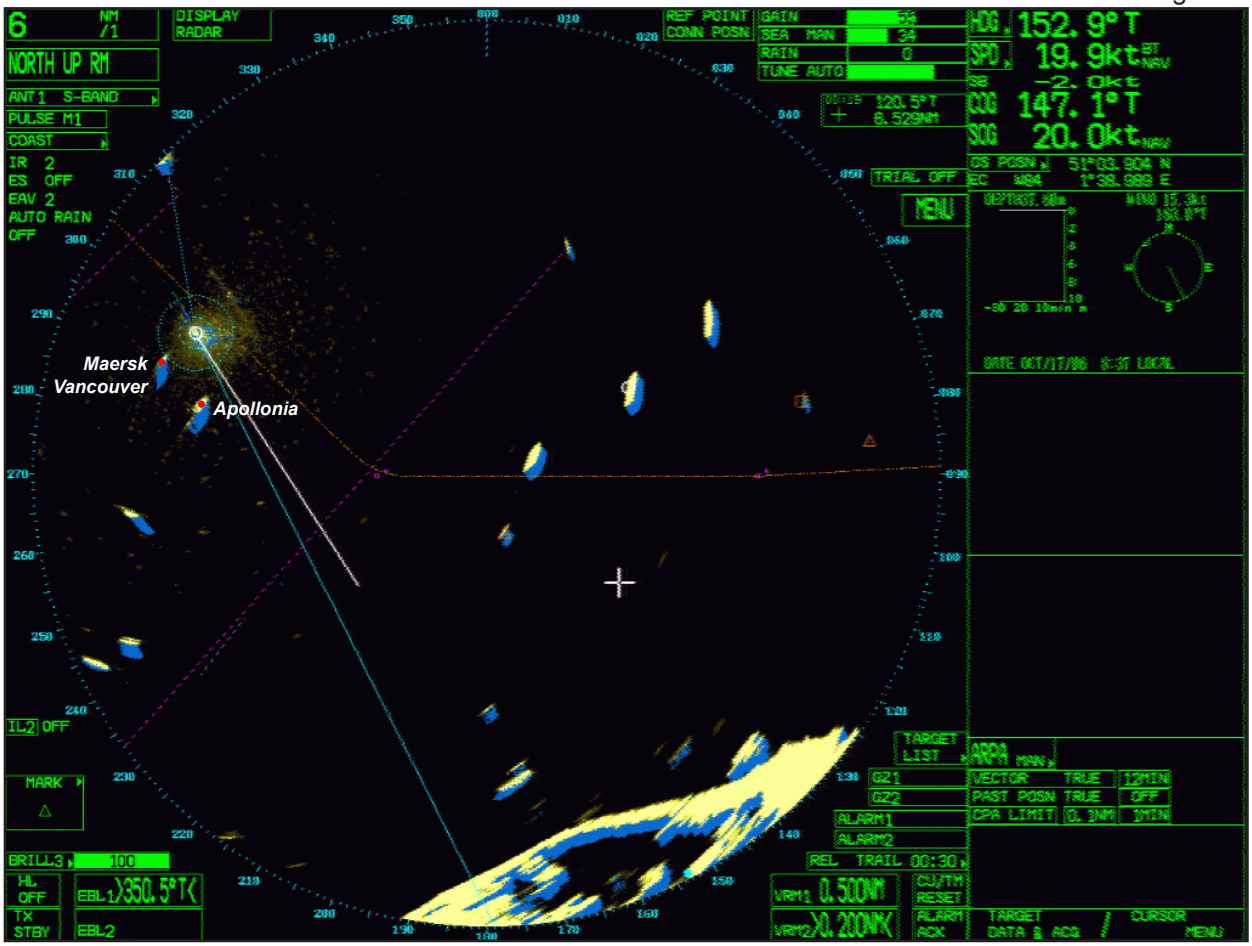


Figure 9

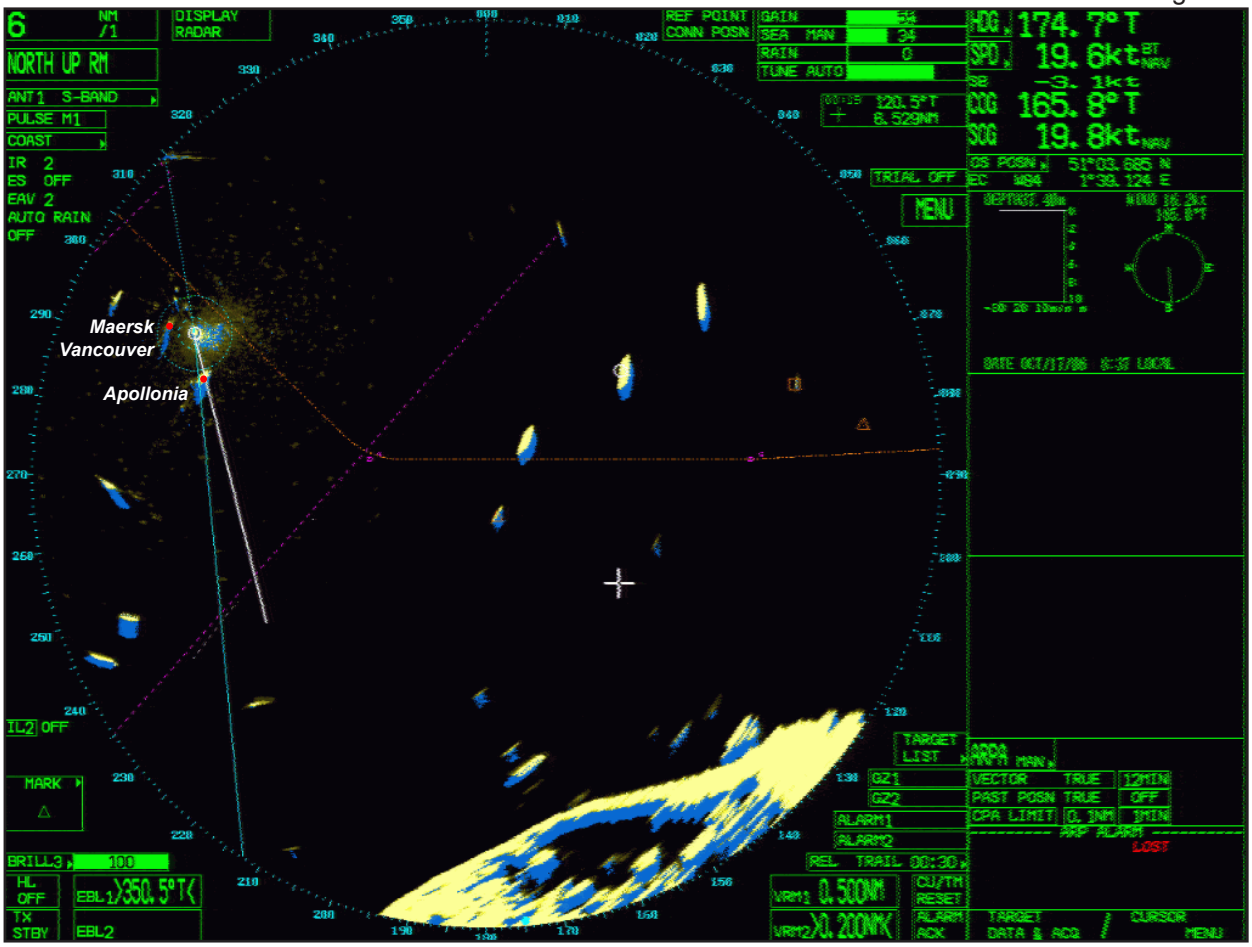


Figure 10

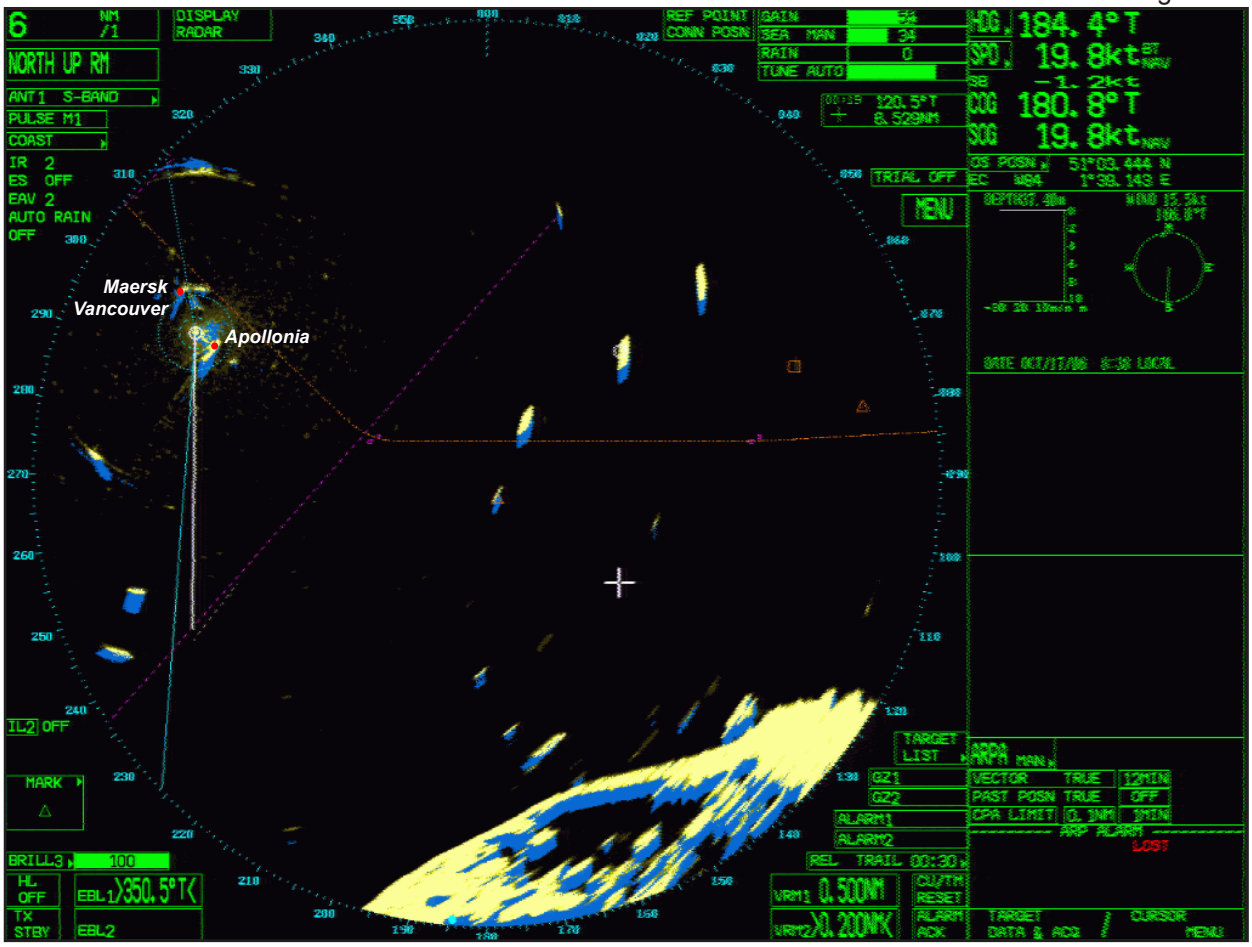
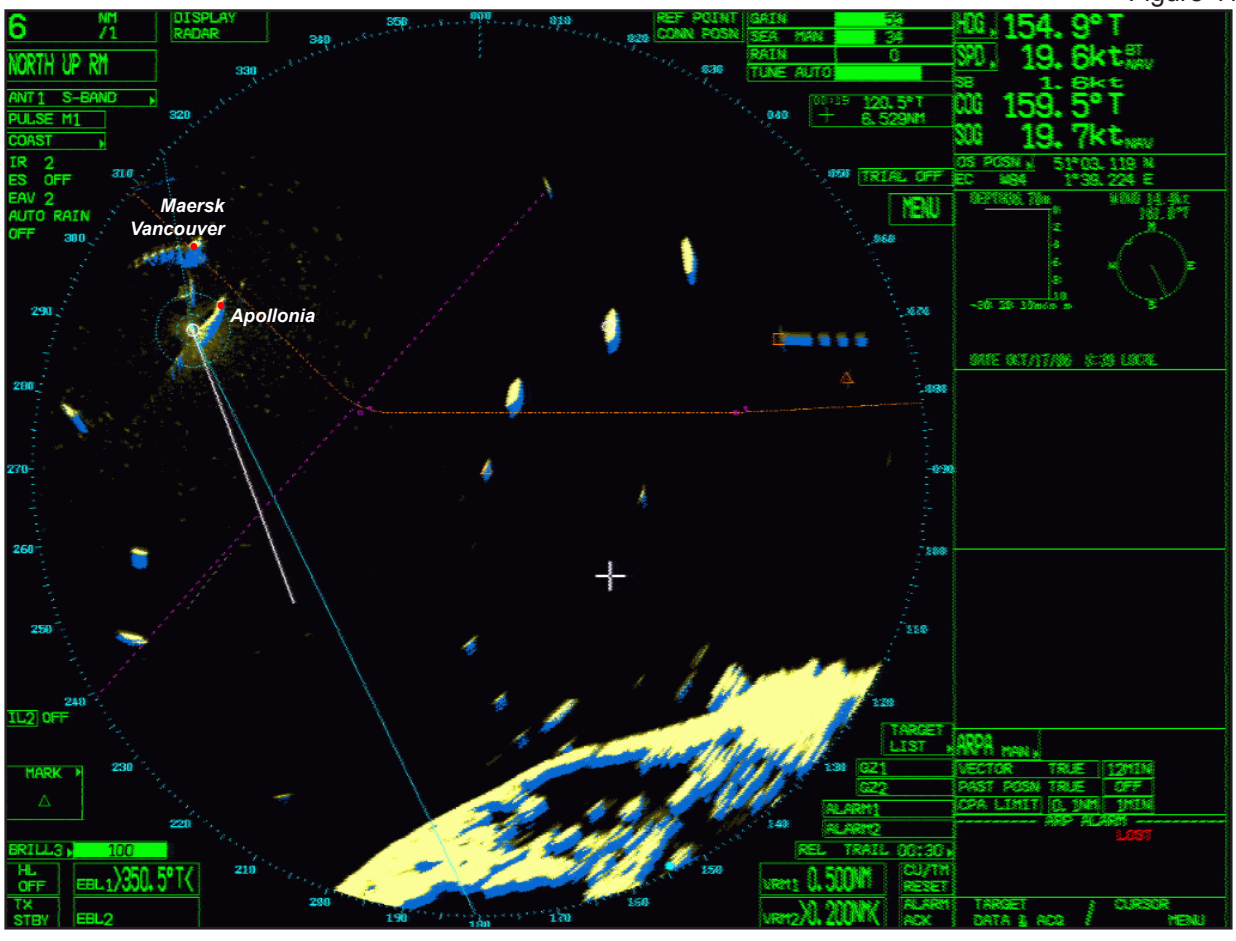


Figure 11



1.8.7 Post incident actions

At 0741, *Maersk Dover* had passed around the stern of *Apollonia* and adjusted course to regain the planned track to Dunkerque. The VDR showed that the 2/O was less concerned about the distance he had passed *Apollonia*, than he was about the distance he had passed ahead of *Maersk Vancouver*.

At 0743, prompted by a request from the QM to the 2/O, the helm was transferred back to automatic steering. One minute later, at 0744, the 2/O informed the QM that his assistance was required at the front of the bridge and for him not to return to bridge cleaning duties. A general discussion then took place between the 2/O and QM, specifically about the distances involved in the close-quarters situation, which lasted for a further 6 minutes.

At 0800, the 2/O overheard a VHF radio conversation between *Apollonia* and Dover Coastguard about the close-quarters situation, and specifically the passing distance of *Maersk Dover*.

Dover Coastguard confirmed that they would be investigating the incident. At 0801.5, the 2/O contacted the master by hand-held VHF radio to inform him of the incident. At 0806, the master arrived on the bridge and was briefed by the 2/O.

At 0810, the 2/O explained to the master that he had been unable to see either vessel on the port radar. The master's immediate response was to ask why the 2/O had not been using the starboard radar, the radar interfaced with the VDR and the display that all OOWs had been told to use. The 2/O was aware that he should have been using the starboard display, but offered no explanation as to why, on this occasion, he had not done so.

Maersk Dover arrived safely in Dunkerque and was all secure at 0852.

1.9 EXAMINATION OF THE PORT ARPA RADAR

From 0811 to 0830, the master examined the controls on the port radar display in an attempt to determine the cause of the poor radar picture. In conversation with the 2/O, the master made him aware that it was necessary to keep a careful watch on the tuning band. The master believed the tuning band should read a minimum of 50 percent as, if it was below that, it was not tuned for optimum performance. The master identified that the tuning bar was reading about 25 percent, and that this was the reason for the poor radar picture.

The following day, MMS contracted a local Furuno agent to examine the display. The report, which can be found at **Annex C**, assessed the performance of the radar as good, but noted that the operator set up was not ideal for best performance. Advice on the optimum setting for the antenna height was provided, and the need for the value to be entered in several picture menus.

1.10 ENVIRONMENTAL CONDITIONS

At the time of the incident, the weather conditions were benign. The logbook recorded that, on departure from Dover, the wind strength was light airs. During the passage across the Dover Strait, sea state was assessed as slight, and the visibility estimated at about 5 miles.

The predicted tidal stream was setting north-easterly at 1.4 knots.

1.11 KEEPING A SAFE NAVIGATIONAL WATCH

Advice for masters and watchkeeping officers regarding the keeping of a safe navigational watch can be found in:

- MGN 315 (M) – Keeping a safe navigational watch on merchant vessels.
- STCW Chapter 8 – Standards regarding watchkeeping.
- ICS Bridge Procedures Guide (3.2 watchkeeping).
- COLREGS.

1.11.1 Lookout

All of the above publications emphasise the need for masters and officers to ensure that a proper lookout is maintained at all times. MGN 315 (M) uniquely refers to the relationship between the lookout and the OOW, and the need for the latter to consider the lookout as an integral part of the bridge team: to utilise the lookout to the fullest extent; and, *to fully engage the lookout's attention by keeping him apprised of the navigational situation with regard to expected traffic*.

1.11.2 Certification

MGN 315 (M) also recognises that (marine) qualifications:

> '*Do not imply that the holder has achieved all the necessary management or operational experience particular to a vessel, its operation or operational area. In considering an officer's or rating's qualifications due consideration should also be given to an individual's experience with respect to the vessel type and/ or area of operation(s). In some circumstances it might be prudent to 'double-up' a watch or provide additional supervision to a qualified watchkeeper whilst particular operational experience is achieved*.'

1.11.3 COLREGS

The COLREGS provide clear and unambiguous rules to be followed by all vessels on the high seas. Key issues, particularly relevant to this incident, are addressed in two sections **(in full at Annex D)**:

Part B Section 1 - The conduct of vessels in any condition of visibility, specifically:

- Rule 5 - The requirement to maintain a proper lookout at all times.
- Rule 7 - How to determine whether a risk of collision exists, and the proper use of radar equipment.
- Rule 8 - The action to take to avoid collision, which shall be such as to result in the passing at a safe distance.

And, not to impede the safe passage of a vessel constrained by her draught.

In Part B Section 2 - Conduct of vessel in sight of one another, specifically:

- Rule 15 - Crossing situations.
- Rule 16 - Action by the give way vessel.

1.12 SAFETY MANAGEMENT SYSTEM

Maersk Dover was in possession of a valid safety management certificate and, under the management of MMS was utilising the Maersk Global Ship Management System (GSMS). The GSMS documentation was substantial, and as the title of the document suggests, was designed to apply to all vessels under Maersk ownership or management.

Section 1356 of the GSMS system addressed bridge team composition, and recognised that:

> '*more demanding navigational conditions will warrant the sole navigating officer to be supplemented with an additional officer*'

and;

> '*the master shall in each instance and in co-operation with the OOW assess the navigational conditions and decide on how many navigating officers to employ'.*

It specifically referred to the master's presence on the bridge, and under what circumstances that was required. In particular, the master's presence was required on the bridge in areas with dense traffic.

GSMS Section 1359 identified the occasions when the OOW was to call the master, including that the master be called in the event that:

> '*traffic conditions or the movement of other vessels cause concern'*

and;

> '*when any one aspect of his/her duties demands undivided attention hampering the attention of other duties'.*

GSMS Section 1357 – Lookout, can be found at **Annex E**. This section explained that the requirement for vessels to maintain a proper lookout in accordance with Rule 5 of the COLREGS was paramount. Clear instructions regarding the briefing of the lookout by the OOW were provided, and specifically that:

> '*the sole purpose of being on the bridge is to maintain an alert lookout'*

and;

> '*the OOW shall instruct the lookout about all relevant observations and report everything seen to the navigating officer'.*

Finally, GSMS Section 1354 acknowledged that there are occasions when an OOW can become distracted. The instruction to both master and OOW stated:

> '*the OOW shall not be assigned or undertake any other duties which could interfere with the safe navigation of the vessel*'.

1.12.1 Master's standing orders

In accordance with the GSMS, and to provide more personal and ship specific instructions, the two masters of *Maersk Dover* had issued joint standing orders **(Annex F)**. That the OOW was to ensure a proper lookout was maintained, was stated twice in the opening three paragraphs, emphasising the importance placed by the masters to the function of the lookout.

The standing orders specified minimum safe passing distances: not less than 1nm ahead of a stand-on vessel, and not less than 0.5nm astern of any vessel.

The standing orders had been read and signed by all OOWs, acknowledging that they fully understood, and would comply with them. One of the two QMs onboard had signed the standing orders, but the QM on watch at the time of the incident had not.

1.12.2 Fleet safety alerts (Ropax)

The GSMS was complemented locally by MMS issuing instructions and guidance in the form of *Fleet Safety Alerts* to the three ro-ro passenger vessels operating on the Dunkerque route. At the time of this incident, seven such safety alerts had been issued. Three safety alerts related to close-quarters situations recommendations proposed following the incidents, and the actions that had been taken. Fleet safety alert No's 003, 005, and 006/2006 are reproduced at **Annex G**.

Fleet safety alerts 003 and 005 both addressed shortfalls in watchkeeping standards at all levels, and made several recommendations designed to improve overall safety standards. Masters were invited to conduct bridge discipline meetings with their bridge teams to ensure the safety alert message was fully understood and adhered to. Both the masters on *Maersk Dover* conducted these meetings.

1.12.3 Audit regime

The main SMS audits were conducted by Maersk employees, and focused on implementation of the GSMS. Local audits, specifically of bridge operations, had been conducted while on passage by the MMS Marine and Safety Manager on an ad hoc basis.

1.13 PREVIOUS INCIDENTS

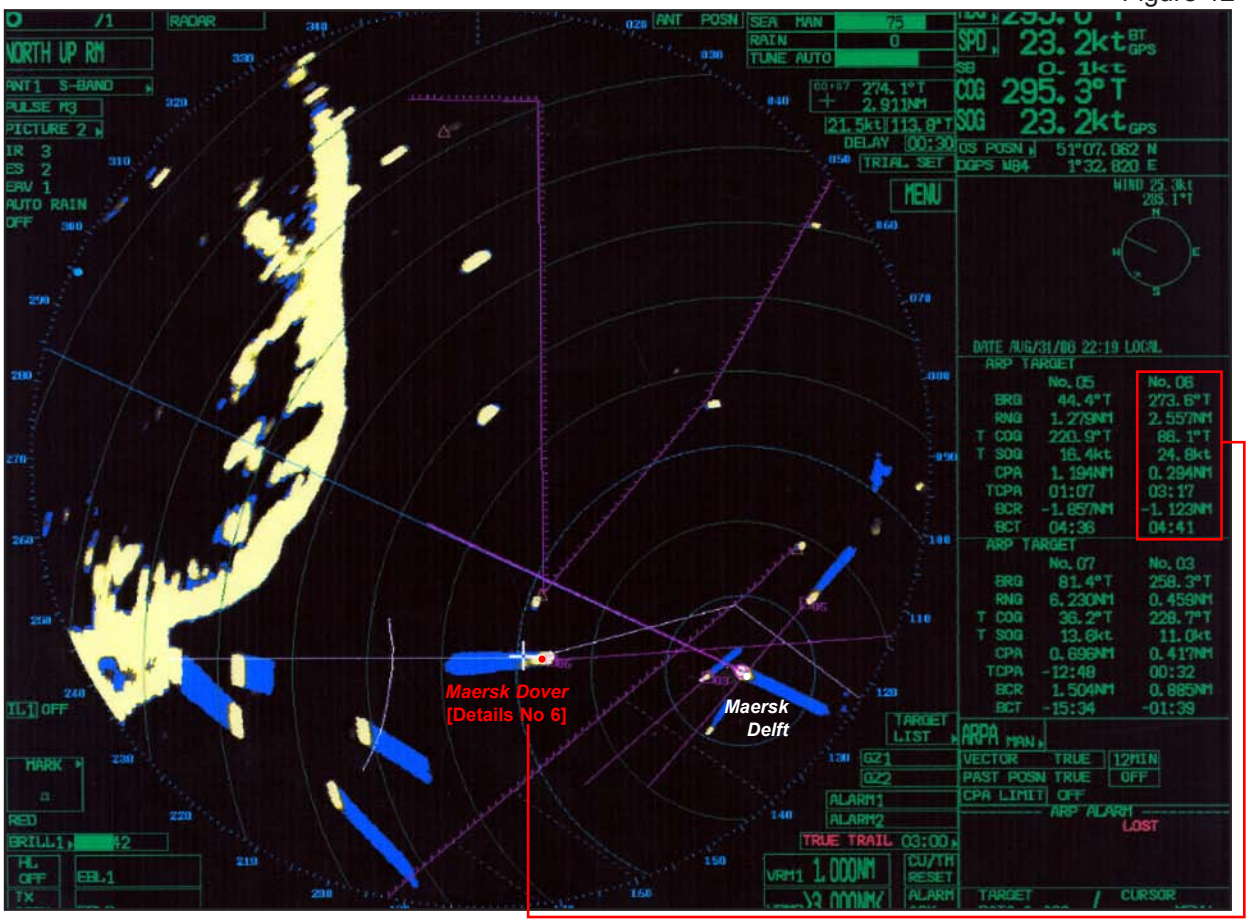
Six days after this incident, the MAIB received a report from MMS regarding an incident that had occurred between two of their own vessels on 31 August 2006. The report was comprehensive, and included VDR download data and witness statements. None of the crew involved in this earlier incident were involved in the *Apollonia* and *Maersk Vancouver* incident.

The incident on 31 August 2006 involved *Maersk Delft,* which was transiting the south-west bound lane towards Dover, and *Maersk Dover,* which was heading east, having just departed from Dover. It was dark, the wind was from the south-west at 20 knots, and the visibility was good. Both vessels were operating at maximum speed and had a closing velocity of approximately 50 knots **(see Figure 12)**.

A close-quarters situation had been allowed to develop with *Maersk Dover* passing 1 cable or less, ahead of *Maersk Delft*.

The MMS investigation led to a number of control measures being put in place (see Section 4.1).

Figure 12



Radar picture seen from *Maersk Delft*

1.14 RECRUITMENT AND RETENTION OF PERSONNEL

MMS acknowledged that the level of expertise of many bridge team personnel was probably at a lower level than was desirable. There were several reasons for this:

- The majority of the deck officers were operating at the highest level that their certificate of competence would allow.
- Internal promotion was difficult due to the lack of suitably qualified officers. As a consequence, promotion by competitive assessment and merit was difficult.
- The terms and conditions offered by competitive ferry operators had the effect of positive retention. This reduced the number of personnel with ferry experience that were available for recruitment.
- A reduction in the availability of experienced ferry officers had led to a decline in the corporate knowledge of Dover ferry operations.
- The increased turnover of personnel within MMS created a burden on training and wasted the long-term benefits gained from understudying senior ranks.
- There was a shortage of suitably qualified UK officers.

1.15 SCOPE OF THIS INVESTIGATION

While investigating this incident, and in order to establish whether the safety issues were generic to ferry operations in the Dover Strait, the opportunity was taken to observe and talk with three other Dover Strait ferry operators, including a fast speed craft operator. The observations have been used in the analysis of this report to ensure a well balanced picture of ferry operations at Dover is presented.

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 work patterns and rest periods of the master, 2/O, and QM indicate that they had the opportunity to be well rested at the time of the incident. The 2/O had only recently joined, the delay being caused by a minor illness. However, there was no reason to believe that his illness had any lasting effects, or that it had adversely affected his performance at the time of the incident.

The hours of rest recorded by the bridge team onboard *Maersk Dover* were in excess of the Merchant Shipping (Hours of Work) Regulations 2002 and ILO requirements. Fatigue is not considered to be a contributory factor in this incident.

2.3 INCIDENT ON 31 AUGUST 2006 BETWEEN *MAERSK DOVER* AND *MAERSK DELFT*

The master of *Maersk Dover* in this incident, who was relatively new to short sea ferry routes, had handed over the watch to the 2/O who had only 7 minutes to become fully apprised of the traffic situation and achieve full night vision. The master was aware of the presence of *Maersk Delft*, and had identified a 'slot' which he advised the 2/O to use for crossing the south-west traffic lane. He decided that a 'green to green' passing with *Maersk Delft* would be appropriate, but he had not called her by VHF radio to confirm their acceptance of his proposed course of action. Consequently, *Maesk Delft* was unaware of his intentions.

The speed of encounter between the vessels had been underestimated, and *Maersk Dover*'s master had not recognised that he was handing over a complex situation to the OOW. In addition, *Maersk Dover* was navigationally constrained in the vicinity of the South Goodwin buoy, nonetheless, on completion of the handover, the master still felt that it was appropriate to leave the bridge.

Under the circumstances, the situation demanded continuity: the master keeping the con, and the OOW assisting him as necessary. At the very least, the master could have remained on the bridge of *Maersk Dover* until he was content that the vessel had safely entered the south-west traffic lane.

Once the OOW had the con and the master had left the bridge, the subsequent actions taken by the OOW were based on false assumptions and were not in compliance with the COLREGS. Because of the speed of encounter, the OOWs on both vessels failed to call their respective masters in sufficient time for them to take positive control, provide assistance or give guidance. Ultimately the situation was resolved by the actions of the OOW onboard the stand-on vessel.

A lack of experience, the absence of a monitoring regime, and the speed of encounter, directly contributed to the incident.

2.4 INCIDENT ON 17 OCTOBER 2006

Poor watchkeeping practices, and the OOW becoming distracted by an incoming SAT C message were major factors in this near miss incident.

Exacerbating factors were: that there was no dedicated lookout; a poor radar watch was being maintained; the speed of encounter with other traffic had been underestimated; and ineffective monitoring of the OOW by the master in an area of high traffic density. Additionally, poor bridge management by the OOW had eroded the service and support that he could normally have expected from the QM.

2.5 MAINTAINING A PROPER LOOKOUT

Essential to keeping a safe navigational watch is the basic requirement of maintaining a proper lookout at all times.

During the departure phase from Dover, bridge resource management was effective, and there was no evidence to suggest that a proper and effective lookout was not being maintained. The QM was appropriately tasked in the role of lookout and bridge administrator, responsibilities that he was fully familiar with. Contacts had been acquired on the starboard ARPA display while the vessel lay alongside, which provided the master with an early assessment of the shipping situation in the south-west traffic lane. The chief officer was available to provide support to the bridge organisation if required.

When the 2/O accepted responsibility for the navigation of the vessel from the master, the QM - a qualified navigational watch rating - had already resumed cleaning the bridge. Consequently, his prime function as dedicated lookout was severely impaired, and in that respect an important safety barrier had been removed. The QM was no longer concentrating on his lookout responsibilities.

Shortly after taking the watch, the 2/O's prime concern was to 'slot' *Maersk Dover* between two groups of vessels transiting the south-west traffic lane. That his lookout was actively engaged in cleaning the bridge, an inappropriate task given the location of the vessel and the traffic density, did not concern the 2/O, and he was still content for the cleaning to continue.

The 2/O was heard to comment on the size of a vessel in the south-west bound lane, which indicated that he was still visually aware just before *Maersk Dover* began crossing the lane. However, even at this early stage, had he taken time to observe the starboard radar display in accordance with MMS instructions, he might have identified a large contact - *Apollonia* - approaching in the north-east bound lane.

At 0729, when the 2/O went to investigate the SAT C alarm sounding at the rear of the bridge, the last remaining safety barrier was removed. There was no longer a visual lookout or radar watch being maintained on the bridge of *Maersk Dover*. The vessel was now crossing the south-west bound lane blind.

As the 2/O became more preoccupied with the SAT C alarm, and the message from the Maersk technical department in Copenhagen, he was unable to maintain situational awareness, particularly of the traffic situation. Having found and then cancelled the alarm, read the message, returned to the port chair and started to telephone the master, the 2/O decided that he would sit on the footrest of the port bridge chair. Choosing to sit on the footrest was ill advised; his view of the horizon

was now obstructed by bridge equipment, and his own aspect was biased to the port side because of the position of the telephone. There was still no effective lookout being maintained more than 6 minutes after the SAT C alarm sounded.

At no time had the 2/O considered: seeking assistance from the QM by reverting him back to his duties as lookout; sitting correctly in the bridge chair at a height were he had an all round view of the horizon; or using the bridge hand-held radio to summon the master to the bridge to discuss the SAT C message. The 2/O had allowed himself to become totally immersed in a telephone conversation with the master which lasted for nearly 4 minutes, discussing the content of a low priority message.

When the telephone conversation with the master was complete, whether he continued to sit on the chair footstool or stood up, the 2/O failed to visually scan the horizon. Had he done so, he would have become instantly aware of *Apollonia* and *Maersk Vancouver* close on his starboard bow.

The basic requirement to keep a proper and effective lookout is promulgated in the COLREGS, STCW 95, MGN 315, ICS Bridge Procedures Guide, the GSMS, and the master's standing orders. In this case, sufficient manpower was available on the bridge but the requirement to maintain an effective lookout had been ignored. The 2/O did not properly manage the assets he had at his disposal and, as the OOW, failed to keep a safe navigational watch by not ensuring that a proper lookout was maintained.

The sole reason the OOW on *Maersk Dover* became aware when he did, of the developing close-quarters situation with *Apollonia* and *Maersk Vancouver,* was the VHF radio call made by the pilot onboard *Apollonia.*

2.6 RADAR

The use of radar played an important part in the circumstances leading to the incident.

2.6.1 Design and training

The bridge of *Maersk Dover* had been designed and fitted with modern, high specification equipment. Technical deficiencies in the radar performance had been reported by masters to MMS, and forwarded to Furuno for rectification. Work was in progress to resolve the deficiencies.

A 3-day Furuno bridge equipment training package had been provided for the first team to join *Maersk Dover*. Whether the duration and scope of the course was adequate for the team to gain a full and proper understanding of the equipment is subjective. To put the training requirement into perspective, the operators' manuals for the Furuno bridge equipment carried on *Maersk Dover* totalled more than 1,500 pages. It is recognised that some manuals contained basic user guides that condensed the essential information, but the large amount of information contained in these manuals only serves to demonstrate the importance of comprehensive and thorough type equipment training.

The 2/O made reference to the complexities of the radar display equipment, particularly the number of sub menus that it was necessary to find and enter before reaching a required adjustment. The 249 page Furuno FAR 2817 operators' manual did not encourage operators, employed on a busy and demanding route, to pursue ways of overcoming problems outside of the basic functions contained in the user guide. However, the compact radar user guide did contain an explanation on how to manually tune the radar.

Deck officers, by virtue of their STCW qualification, are already qualified in basic ARPA operations, but the complexity of some modern radar systems requires additional type specific training. Whether that be onboard or ashore, owners and operators have a responsibility to ensure that officers unfamiliar with key navigational equipment receive appropriate training and are fully competent in its operation before being allowed to take charge of a navigational watch.

2.6.2 Use and operation

Before accepting the watch from the master, the 2/O familiarised himself with the radar picture and he had acquired contacts on the port display. There was no reason to believe that the equipment was underperforming at this time, as his visual references corresponded with the radar picture. Subsequent to taking the watch from the master, no further contacts were acquired on the port or starboard displays. Although the visibility was estimated at about 5 miles, once in the south-west traffic lane, the 2/O failed to recognise, because of the visibility, that some radar contacts were not visible on the port screen. However, the absence of a coastline on the 12 mile range scale might have alerted him to the port radar's poor performance. Awareness of a degraded picture quality on the port radar display might have prompted the 2/O to examine the radar set up or, if in doubt, to use the starboard display. He might then have noted that a potential close-quarters situation was developing.

After the incident, the master identified that the auto tune readout on the port radar display was showing less than the minimum required for a satisfactory picture. His two attempts at manually tuning the display after the incident finally achieved the return of a satisfactory picture. The 2/O had not realised that the auto tune readout, positioned at the top right corner of the main display, was reading significantly below normal, and that he could visually see vessels that were not showing as contacts on his radar display. There are two possible reasons for the error: either the 2/O lacked an understanding of the effects of radar tuning and the adjustments necessary to obtain the best radar picture, or that an effective radar watch was not being maintained.

It is not known what caused the port radar to underperform. An examination by a manufacturer's representative the following day was unable to establish a satisfactory explanation. This determined the performance was good, other than that a default antenna height had been set. The correct height of the scanner above sea level was entered, but the previous incorrect setting had not noticeably affected the radar's performance. The main radar operator manual, section 1.10.4, explains to the operator that if the automatic tuning is not working properly then the system should be re-initialized. The compact user guide takes the operator through the actions required to do this; this guide would be best placed adjacent to the equipment, readily available to the user.

Both displays provided the operator with the option of setting automatic acquisition zones. Designed to automatically acquire contacts within an operator defined zone, and alert him accordingly, the facility can be unpopular in areas of high traffic density due to the number of alarm alerts. However, by carefully defining the area of interest to minimise unnecessary alarms, when used with caution the facility provides an additional safety barrier. Had the 2/O chosen to use the automatic acquisition facility on the starboard radar display, it would have alerted him at an early stage to the presence of *Apollonia*. Furthermore, had the QM followed the instructions contained in fleet safety alert 005/2006 **(Annex G)**, his assistance in radar picture compilation on the remaining (port) display would probably also have detected *Apollonia* in good time.

2.6.3 Radar in use

The VDR playback of the starboard radar shows that this display was providing a good quality picture throughout the period of this incident.

Once the master had handed over the watch to the 2/O, had the latter complied with the instructions issued by MMS in their safety alert 003/2006, which required the picture on both radar displays to be maintained, he would very quickly have become aware of both the presence of *Apollonia* and the poor performance of the port radar display. By complying with fleet procedures, an additional safety barrier would have been incorporated into the watchkeeping organisation.

2.7 COMMAND AND CONTROL

2.7.1 Master / OOW handover

The standard operating procedure on *Maersk Dover* required the officer on duty to take charge of a mooring station for the vessel's departure. Once all ropes had been recovered and the area secured for sea, the officer proceeded to the bridge ready to assume the duties and responsibilities of the OOW. The time taken by the officer to leave the deck and arrive on the bridge normally meant that the vessel had cleared Dover harbour, increased to passage speed, and was preparing to cross the south-west traffic lane. By the time the OOW had familiarised himself with the situation, and the master had completed his handover, the vessel was approaching the South Goodwin buoy from the west.

This was a critical phase of the passage, which required the OOW to have a complete awareness of the situation, particularly traffic movements and navigational constraints. This procedure was made harder during periods of darkness, when it also was necessary for the OOW to become fully accustomed to the dark and achieve good night vision.

Generally, the master had completed the handover to the OOW prior to the vessel altering course into the south-west lane. The routine was common practice and allowed the master to leave the bridge and carry on with other work, content in the knowledge that the OOW had received a proper handover and was fully apprised of the navigational situation. This pattern of operation could, however, reduce the master's role to that of harbour and berthing pilot at each end of the passage.

The impact on the OOW was that before taking responsibility for safely manoeuvring into, across, and out of the Dover Strait TSS, he had just 6 to 8 minutes on the bridge in which to become fully apprised of the traffic situation and the intentions for crossing the south-west lane. During this time, he would be assisted by only the QM. Whether the pressure for the master to leave the bridge near the South Goodwin buoy to attend to other duties was perceived or actual, it is undesirable that OOWs should routinely be left to navigate, at high speed, across the busiest waterway in the world.

A fuller assessment by the master at the start of each crossing would help determine whether there was a requirement for him to remain on the bridge for all, or part of the crossing. The assessment could examine: the prevailing environmental and traffic conditions; the experience of the bridge watchkeeping team; any deficiencies in equipment; the speed of the crossing; and the need for long range scanning, to assess the options for crossing the second lane of the TSS. The presence of the master on the bridge for all or part of the crossing would provide a command overview, support and a source of advice to the OOW.

2.7.2 OOW / QM relationship

The VDR records highlighted the extremely informal relationship between the OOW and the QM. It is possible that the type of relationship has been guided by company or shipboard ethics, or by personal preference. However informal the relationship, there remains a clear responsibility on the OOW to ensure that the bridge is managed and supervised effectively, instructions and guidance are complied with, and excessive and trivial conversation does not cause distraction or under stimulation. Once the QM had commenced manual steering, the OOW's lack of direct helm orders was inappropriate, and could have resulted in the QM inadvertently compounding the situation.

If similar incidents are to be avoided in the future, bridge teams must remain focused, alert and aware of their surroundings. They should make full use of all available equipment, and mutually support each other in the event of work overload or distraction. The challenge for masters is to create, maintain, and manage a dynamic and responsive bridge environment that operates on best practice and is capable of dealing effectively with emergency situations, particularly in congested waters. In practice, because of the routine nature of a ferry service, this might require the master's presence on the bridge for longer, and for him to become a more integrated part of the organisation with an increased oversight of bridge operations.

2.7.3 Harbour stations

The Code of Safe Working Practices (COSWOP) requires a responsible officer to take charge of a mooring station during arrival and departure. Prior to this incident, the 2/O was in charge of the aft mooring station for departure from Dover. However, the consequent delay to his arrival on the bridge to take over the watch from the master resulted in the handover being completed at a critical point, just before *Maersk Dover* crossed traffic lanes. In common with other ferry services operating from Dover, MMS should thoroughly examine deck officer routines, and consider implementing a system whereby the incoming OOW can be present on the bridge before the vessel leaves the berth.

Such a system would allow the OOW to assess the traffic situation on departure, compile and maintain a radar plot and, working as part of a team with the master, establish the likely route for crossing. This would reduce the need for time consuming handovers, at critical points in the voyage such as when the vessel is crossing busy traffic lanes.

2.7.4 Communications

A SAT C communications terminal is only a requirement for SOLAS vessels operating in, and certified for, the A3 area. However, although *Maersk Dover* continuously operated in the A1 area, because she was certified for and carried the equipment for the A3 area, her A3 GMDSS equipment was required to be operational.

When SAT C is fitted as part of the GMDSS equipment, and when the OOW is the nominated GMDSS operator, SAT C is routinely fitted on the bridge so that he can be aware of all GMDSS related communications. However, SAT C is also used routinely for non-GMDSS ship/shore communications, such that there is a danger that, as in this case, the OOW finds himself regularly having to deal with non-urgent commercial message traffic.

This scenario can be likened to the issues raised in MGN 299 – *Interference with safe navigation through inappropriate use of mobile phones,* which addresses the issue of bridge management teams becoming distracted from their primary duties of navigating and conning the vessel.

STCW requires that (Section A – V111/2 part 3-1):

> *The officer in charge of the navigational watch shall not be assigned or undertake any duties which would interfere with the safe navigation of the ship.*

Companies must ensure that systems are in place such that OOWs are not distracted from their primary duties.

2.8 SPEED OF ENCOUNTER

2.8.1 Background

Discussions with the managers and ships' masters from other Dover ferry operations identified that high speed of encounter, particularly with fast container ships, had become a common area of concern.

Historically, by the nature of their trade, ferries have had higher service speeds than most of their general cargo or tanker counterparts. Their additional speed provided ferries with a certain amount of flexibility, adjusting course early to avoid potential close-quarters situations and to cross lanes with minimum disruption. However, the impact of containerisation on the shipping industry, with an associated logistics chain driven by deadline and speed, has seen a slow but steady increase in the service speed of container ships.

2.8.2 The effects

Table 1 shows speed of encounter and the distance travelled over the ground in a 12 minute time interval. Three examples are given, of two vessels approaching a collision at identical speed, but from different aspects.

Example 1. Typical of a vessel crossing a TSS, with the vessels approaching each other at right angles.

Example 2. One vessel approaching the other from 045º on the bow.

Example 3. Head on approach, with both vessels on reciprocal courses.

	Example 1 Right angle app		Example 2 Red 45º app		Example 3 Reciprocal app.	
Vessel speeds (knots)	Distance closed (nm)	Closing Speed (knots)	Distance closed (nm)	Closing Speed (knots	Distance closed (nm)	Closing Speed (knots
10	2.8	14.0	3.7	18.5	4.0	20.0
15	4.25	21.25	5.5	27.5	6.0	30.0
20	5.65	28.25	7.3	36.5	8.0	40.0
25	7.1	35.5	9.3	46.5	10.0	50.0

Table 1: Speeds of encounter/distance travelled in a 12 minute period.

In this case, with *Maersk Dover* steering 130º at 21 knots, and *Maersk Vancouver* steering 040º at 21 knots, they were closing at approximately 30 knots, a distance of 6 miles every 12 minutes.

This highlights the increasing importance of the OOW maintaining situational awareness. Additionally, in the event that an OOW requires the master's assistance, the higher speed of encounter means less time for the master to reach the bridge and gain an appreciation of the situation.

2.8.3 Experience

Although the 2/O had previous ferry experience, it was of significantly less congested routes than that found between Dover and Dunkerque. Most had longer passage times, and the schedules were less intense.

That the bridge watchkeeping environment could be considered less demanding on these routes, is subjective, but the 2/O certainly believed that the periods and speeds of encounter were less demanding. When he first commenced watchkeeping on the Dover to Dunkerque route, he immediately became aware of the increased speed of encounter and the high level of attention necessary to maintain a safe watch. It is regrettable that his early awareness was not enduring.

By the time of this incident, it is possible that the 2/O had gathered enough Dover Strait operating experience to be lulled into a false sense of security. He had allowed his attention and concentration to fall below a level commensurate with keeping a safe navigational watch on that route. Furthermore, his attention to watchkeeping responsibilities was removed completely when he became distracted by the SAT C message.

MGN 315 recognises that qualifications do not necessarily imply that an officer has achieved all the necessary management skills or operational experience necessary for a particular role or route. Consequently, there are circumstances when it might be necessary to double up on a watch until the necessary skills and operational experience are achieved. The circumstances surrounding this incident support that principle; had the master monitored the performance of the 2/O closer, he might have become aware of some of his shortcomings and adjusted the composition of the watch accordingly.

2.8.4 Comparison with High Speed craft

It is worth comparing the routines in conventional ferries with those of high speed craft. These vessels have overcome the hazards associated with speed of encounter by instigating a dual watchkeeping regime consisting of master and an OOW. Further additional support is provided by a lookout. This type of organisation provides close co-ordination, immediate support, and the ability to maintain a radar watch consisting of close and long range scanning simultaneously. The organisation allows team building, but at the same time allows the master to monitor the performance of the OOW at all stages of the passage. The standard of watchkeeping on high speed craft has been further enhanced by the SOLAS high speed craft code, which requires officers to be appropriately trained and hold a type rating certificate. While high speed craft are, by definition, faster than conventional ferries, the closing speeds with fast transiting traffic in the Dover Straits are not that dissimilar. Additionally, the conventional ferries

are considerably less manoeuvrable and often have greater numbers of passengers onboard. It is therefore appropriate for companies operating conventional ferries in this sort of environment to consider how they can ensure a level of watchkeeping closer to the high speed craft standard. As there are two masters onboard, effectively doing 12 hours on/12 hours off watchkeeping, there is no reason for them not to be routinely available to supervise and augment the OOW and bridge team.

2.9 ISM

The Maersk GSMS was extremely comprehensive and the greater part of the guidance it contained, although generic, was applicable to a Dover Strait ferry operation. However, some sections pertaining to bridge instructions required clarification; the bridge team composition, the master's presence on the bridge, and the requirement for lookouts were clearly more relevant to other ship types.

These issues, together with individual job descriptions and responsibilities, might have been better addressed as a separate publication or in a section of the GSMS devoted to ro-ro passenger vessels. These instructions could then focus on best practice in bridge watchkeeping for ferry operations.

2.10 PERSONNEL

At the time of this incident, MMS's management of Norfolkline's vessels was relatively embryonic. Ideally, the initial recruitment should have provided a complete officer corps with ferry experience. In reality, there was a need to further recruit from the wider maritime community which had the effect of diluting the ferry operation's knowledge base.

That there were no chief officers suitably qualified or with the necessary experience for internal promotion to master, shows the constraints MMS was working under. Supply and demand dictated that officers had to be employed in the most senior position that their qualification would allow. This is acceptable, however, MMS did not recognise the need to impose additional control measures that would guard against potential shortfalls caused by the level of experience and qualification of its officers. The control measures could have included greater supervision and monitoring by the master and, if appropriate, greater monitoring by the MMS marine and safety manager. Dual monitoring might have identified any weaknesses in the command and watchkeeping organisation early, allowing rectification measures to be put in place.

Safe bridge watchkeeping in the Dover Strait will always need considerably more involvement from the master than on most other ferry routes. However, basic standards of watchkeeping will be significantly enhanced by recruiting and retaining well trained, experienced, and motivated personnel.

SECTION 3 - CONCLUSIONS

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

1. This accident occurred as a result of poor watchkeeping practices, and the OOW becoming distracted by an incoming SAT C message. [2.4]

2. The OOW choosing to sit on the footrest was ill advised as his view of the horizon was obstructed by bridge equipment. [2.5]

3. Sufficient manpower was available on the bridge, but the requirement to maintain an effective lookout had been ignored. The 2/O did not properly manage the assets he had at his disposal and, as the OOW, failed to keep a safe navigational watch. [2.5]

4. When the 2/O went to investigate the SAT C alarm, the last remaining visual safety barrier was removed. There was no longer a visual lookout or radar watch being maintained on the bridge of *Maersk Dover*. [2.5]

5. Once the QM had commenced manual steering, the OOW's lack of direct helm orders was inappropriate and could have resulted in the QM inadvertently compounding the situation. [2.7.2]

3.2 OTHER SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION ALSO LEADING TO RECOMMENDATIONS

1. The complexity of some modern radar systems requires additional type specific training. Owners and operators have a responsibility to ensure that officers unfamiliar with key navigational equipment receive appropriate training and are fully competent in its operation before being allowed to take charge of a navigational watch. [2.6.1]

2. The 2/O failed to recognise that the port radar screen was not displaying some targets. [2.6.2]

3. The master completed the handover to the OOW prior to the vessel altering course into the south-west lane. The routine was common practice, and it allowed the master to leave the bridge and carry on with other work, content that the OOW had been given a proper handover and was fully apprised of the situation. [2.7.1]

4. The presence of the master on the bridge for all or part of the crossing would have provided a command overview, support and source of advice to the OOW. [2.7.1]

5. The challenge for masters is to create, maintain, and manage a dynamic and responsive bridge environment that operates on best practice and is capable of dealing appropriately with situations, particularly in congested waters. This might require the master's presence on the bridge for longer periods. [2.7.2]

6. High speeds of encounter, especially with fast container vessels, is becoming of increasing concern to Dover Strait ferry operators. [2.8.1]

7. As there are two masters onboard, effectively doing 12 hours on/12 hours off watchkeeping, there is no reason for them not to be routinely available to supervise and augment the OOW and bridge team. [2.8.4]

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

1. Had the QM followed the instructions contained in fleet safety alert 005/2006, his assistance in radar picture compilation on the remaining (port) display would probably also have detected *Apollonia* in good time. [2.6.2]

2. The delay in the OOW arriving on the bridge to take over the watch from the master caused the handover of the watch to be completed at a critical point just before *Maersk Dover* crossed the traffic lanes. [2.7.3]

3. There are circumstances when it might be necessary to double up on a watch until the necessary skills and operational experience are achieved. [2.8.4]

4. Some ISM procedures and instructions required clarification and were more relevant to other ship types. These issues might be better addressed as a separate publication, or in a section of the GSMS devoted to ro-ro passenger vessels. [2.9]

5. Safe bridge watchkeeping in the Dover Strait will always need considerably more involvement from the master than on most other ferry routes. Additionally in the case of MMS, the standards of watchkeeping will be significantly enhanced by recruiting and retaining well trained, experienced, and motivated personnel. [2.10]

SECTION 4 - ACTION TAKEN

4.1 MAERSK MARINE SERVICES

Following the close-quarters situation between *Maersk Dover* and *Maersk Delft* on 31 August 2006, the company took the following actions to try and prevent the recurrence of a similar incident:

- A cross-Channel routeing system between Dover to Dunkerque was established.
- Masters were instructed to remain on the bridge until their vessel had passed the South Goodwin Buoy and they were satisfied it was safe to enter the routeing system. They were also instructed to monitor OOW compliance with bridge standing orders.
- A trial was conducted to retain the OOW on the bridge during departure from Dover. However, this created other manning problems, and the master / OOW handover period was achieved by the master remaining on the bridge for longer.
- OOWs were instructed to ensure they called the master in ample time so that any necessary actions could be carried out in a safe and timely manner.
- QMs were instructed to take an active interest in the safe navigation of the vessel at all times.
- With respect to bridge equipment, VHF volumes were to be closely monitored, and a full anti-collision plot was to be continuously maintained on both radar displays.

4.2 MAERSK MARINE SERVICES

Following this incident, the company identified and made several recommendations to try and ensure that similar incidents were avoided in the future:

- Masters were instructed to ensure that OOWs were fully aware of, and complied with, all mandatory requirements for safe navigation in the Dover Straits, and with bridge and masters' standing orders.
- Masters were instructed to monitor the effectiveness of the bridge teams while on passage.
- On passage, the QMs were instructed to assist the OOW with the safe navigation of the vessel at all times, and to draw his attention to all targets. QMs were further instructed that cleaning duties were only to be carried out in port.
- Plans were put in place for all bridge teams to attend team management courses, and for QMs to be sent on radar courses.
- In addition, Maersk Marine Services has accepted the secondment to the company of an MCA surveyor for 1 year, tasked to advise on and implement any improvements that could be identified.

SECTION 5 - RECOMMENDATIONS

Maersk Marine Services is recommended, for its cross-Channel ferry operations, to:

2007/145 Introduce procedures to ensure that before an OOW keeps his/her first unsupervised watch:

- They have been assessed by the master to confirm they are fully competent to keep a safe navigation watch,

and

- They have been fully trained and locally assessed on type specific bridge equipment.

2007/146 Identify sources of distraction for bridge watchkeepers, and introduce measures to minimise these. Such measures should include procedures for handling routine commercial message traffic away from the bridge.

2007/147 Review the tasks and workload of masters, to allow them to spend as much time on the bridge as circumstances require.

2007/148 In light of the increasing speed of ferries and of transiting traffic in the Dover Strait, and in view of the enhanced arrangements utilised by high speed craft, risk assess the route to determine the optimum arrangements for the maintenance of safe navigation.

Marine Accident Investigation Branch
May 2007