Report on the investigation of

the contact between

Isle of Mull

and

Lord of the Isles

and subsequent contact with Oban Railway Pier

Oban Bay

29 December 2004

Marine Accident Investigation Branch
Carlton House
Carlton Place
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Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2005 – Regulation 5:

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

NOTE

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

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

CPP	-	Controllable Pitch Propeller
DPA	-	Designated Person Ashore
ISM Code	-	International Safety Management Code
OOW	-	Officer of the Watch
QM	-	Quarter Master
RO-RO	-	Roll-on, roll-off (ferry)
rpm	-	revolutions per minute
SOLAS	-	Convention on the Safety of Life at Sea
UTC	-	Universal Time Co-ordinated
VHF	-	Very High Frequency (radio)

SYNOPSIS

Just after 1900, on 29 December 2004, the Caledonian MacBrayne ro-ro ferry, *Isle of Mull*, glanced off *Lord of the Isles*, which was moored alongside, and then made contact with Oban Railway Pier bow on, at an estimated speed of 4 knots. There were no passengers onboard and no injuries were sustained as a result of the impact. The bow visor and port side of the fo'c'sle were substantially damaged and the vessel was withdrawn from service for repairs.

Narrative

The master and second officer were on watch at the time of the accident. Both had joined the ship that day after leave periods. The master had been first officer on *Isle of Mull* for 6 years and, at the time of the accident, master for 1 year. The second officer was a relief officer who had served on many of Caledonian MacBrayne's fleet, including *Isle of Mull* 3 months earlier.

The second officer was the OOW on the passage from Craignure to Oban and had called the master at the designated point. *Isle of Mull* entered Oban Bay via the north channel and the OOW handed over to the master on the northern edge of Oban Bay. The OOW then continued with his arrival checklist routine. Prior to completing the final turn before berthing, the master moved from the centre control console to the starboard wing control console and transferred control of the main propulsion. It then became apparent the master had forgotten to start the bow thrusters at the centre control. The OOW started the bow thrusters at the same time as the master applied 50% astern. Shortly after, the OOW shouted to the master that he did not have control of the port engine which was still set 50% ahead at the centre console. Control of the port CPP was rapidly transferred out to the starboard bridge wing and 100% astern applied by the master. *Isle of Mull* did not slow or turn sufficiently, resulting in her glancing off *Lord of the Isles* before hitting the pier.

Analysis

The catalyst for this accident occurring was the master forgetting to turn on the bow thrusters. Although the error was spotted as part of the normal arrival checklist, its rectification delayed the OOW identifying that the master did not have control of the port engine. By the time this second problem had been corrected, there was insufficient sea room to slow or manoeuvre the ship and she made heavy contact with the pier.

Although audited by shore side management under an ISM system, many of the bridge practices employed on *Isle of Mull* were poor or ineffective. There were many assumptions made by the bridge team, with no arrival briefing or positive reporting of key actions. There was also poor communication between the bridge and engineering teams. Finally, the instruments were not used to their full capabilities due to poor procedures and, possibly, poor ergonomics.


Corran Ledge Buoy
“Lighthouse Pier”
Maiden Island
Carraig Mhicheil
Dunollie
HUTCHESONS MONUMENT
Corran Ledge
TOWER
Ardantrive Bay
OBAN BAY
OBAN
North Pier

Safety Issues

Arrival Checks -

Neither the passage plan nor the master's standing orders included a defined point by which time the harbour arrival checklist must be completed.

There was a strong reliance on being able to contact a member of the foredeck crew by radio in the event of having to let go anchors.

Bridge Management -

The monitoring of the master's actions and decisions by the OOW were not effective.

There was no bridge team briefing by the master to inform the team of his intentions.

There was no positive reporting when important tasks had been completed by the bridge team.

Insufficient checks were carried out to ensure propulsion control had been transferred to the bridge wing.

The master was distracted at the time when he would have normally switched on the bow thrusters.

It was not possible to make any safety announcement when contact with the pier was inevitable, and it was fortunate that there were no passengers onboard at the time of the accident.

The bridge team were unaware that the automatic pitch shedding control card was being removed while on passage and replaced for berthing.

Ergonomics -

The dimmer controls in the bridge did not enable optimal viewing of critical gauges and switches when operating during the hours of darkness.

Safety Management -

Routine and over-familiarity possibly contributed to a decline in the standard of bridge procedures and awareness of potential emergencies.

Internal audits of navigational practice had not highlighted any particular concerns about harbour arrival routines.

There was a reluctance to impose more procedures and checklists on bridge teams by shore management, believing this would not improve safety.

Recommendations

Caledonian MacBrayne has taken extensive action following its own and the MAIB's investigations to address the safety issues that have been identified, and consequently no additional recommendations are made in this report.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *ISLE OF MULL* AND ACCIDENT

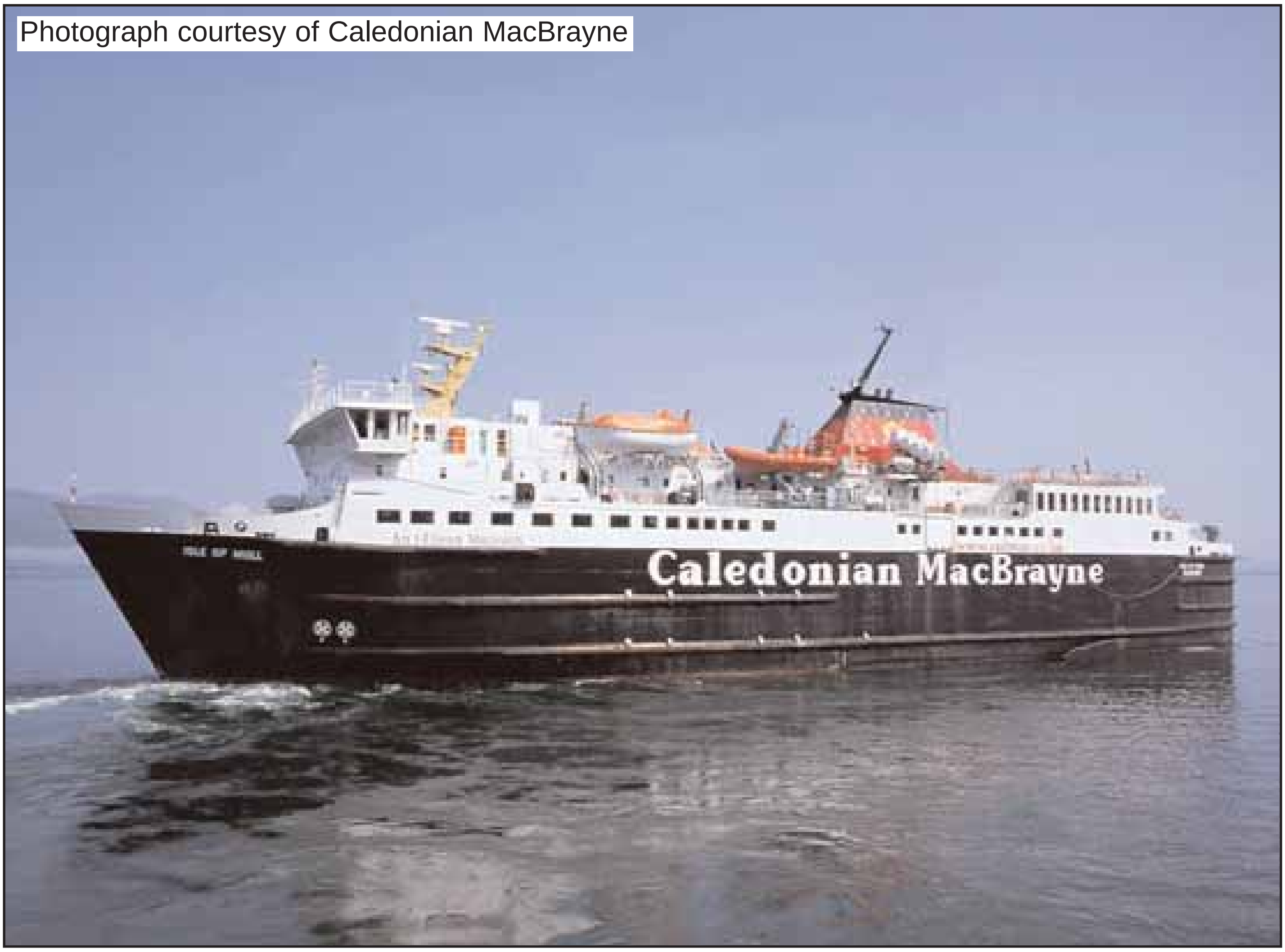
Vessel details

Registered owner	:	Caledonian MacBrayne
Port of registry	:	Glasgow
Flag	:	UK
Type	:	Ro-ro vehicle/passenger ferry
Built	:	1988 – Appledore Ferguson, Port Glasgow
Classification society	:	Lloyd's Register
Construction	:	Steel
Length overall	:	90.1m
Gross tonnage	:	4,719
Engine power and type	:	3450kW, 2 medium speed diesel engines
Service speed	:	14.5 knots
Other relevant info	:	Twin CPP with Becker rudders and twin bow thrusters

Accident details

Time and date	:	19:05, 29 December 2004
Location of incident	:	Oban Harbour
Persons on board	:	26
Injuries/fatalities	:	None
Damage	:	Major damage to bow visor and port side of fo'c'sle at deck level. Vessel withdrawn from service for repair.

Figure 1



Photograph courtesy of Caledonian MacBrayne

Isle of Mull

1.2 PARTICULARS OF *LORD OF THE ISLES*

Vessel details

Type	:	Ro-ro vehicle/passenger ferry
Built	:	1989 – Appledore Ferguson, Port Glasgow
Construction	:	Steel
Length overall	:	84.63m
Gross tonnage	:	3,504

Accident details

Damage	:	Shell plating and bulwarks set in on port bow. Watertight integrity remained intact.

1.3 NARRATIVE

All times are UTC

On 29 December 2004, as part of crew scheduling that ensures 50% of the crew have been onboard at least one week, the master and chief engineer joined *Isle of Mull* alongside Oban Pier, prior to the 1200 sailing. This voyage took the ship on a round trip to Colonsay, returning to Oban at 1705. Normally this would have been the last voyage of the day, but that day *Isle of Mull* conducted an additional voyage to take traffic that had not been able to sail on the previous scheduled crossing to Craignure. This was due to the ferry, *Clansman*, being temporarily replaced by a smaller vessel, *Lord of the Isles*, following damage sustained while berthing in Oban on 17 December 2004.

Before *Isle of Mull* departed from Oban for Craignure at 1730, there was another change of crew which included the second officer. After reporting to the bridge, the second officer went below to unpack and have a meal. He returned to the bridge shortly before the ship arrived at Craignure, and agreed with the chief officer to stand watch on the return leg to Oban. He supervised the discharge of cargo and returned to the bridge just before the ship sailed. The master conned the ship on departure using the port wing control console, and after clearing the berth, engaged the autopilot on a course for the first waypoint. He then handed over the watch to the second officer, with instructions to call him, as was normal practice, when the ship was five cables off Maiden Island.

The passage was without incident, the ship proceeding at 14.5 knots with 100% pitch set on the Controllable Pitch Propellers (CPP), and the OOW called the master as instructed. He then made a routine safety announcement on VHF to warn other water users that *Isle of Mull* was approaching Oban Bay from the north. The quarter master (QM) then commenced manual steering in response to helm orders from the OOW. The master arrived on the bridge and, shortly afterwards, the OOW ordered ‘stand-by engines’ and reduced the CPP pitch to 80%. As *Isle of Mull* was passing the Corran Ledge buoy (Chart 1), the OOW handed charge of the ship to the master.

On handover, the master was controlling the engines at the central control console, with the QM standing on his left at the helm. The OOW stood to the left of the QM completing the arrival/departure checklist **(see Annex A)**. Also on the bridge were the chief officer, observing, and the third officer, who was completing some paperwork at the back of the bridge.

The master reduced CPP pitch to between 50% and 60%, and instructed the QM to steer for the lighthouse pier. The OOW continued working through the arrival checklist, while glancing at the radar and out of the window. As the ship neared the lighthouse pier (2-3 cables off) the master instructed the QM to steer for the link span, then, shortly after, the gable end of the new Caledonian MacBrayne office on the pier. This would start a turn to port to bring *Isle of Mull* round towards the north-east, allowing her to then run astern to berth at the link span.

After instructing the QM to steer for the gable end, and when the lighthouse pier was roughly abeam, the master moved to the starboard bridge wing control console and the OOW took over the position vacated by the master. The master's first action was to transfer control of both CPPs to his console and believed he saw both port and starboard 'in-command' lights illuminated **(see Figure 7, shown on page 13)**. The dimmer controls on these instrument gauges had not been adjusted since the master had last used them when arriving in Oban at 1705.

Around this time, the OOW saw on the central control console that the bow thrusters had not been started, and informed the master, who had also noticed, as he had been about to transfer control of the bow thrusters to his console. Normally, the master would have started the bow thrusters while the ship was heading towards the lighthouse pier, but on this occasion had forgotten, possibly because he was distracted by making conversation with the bridge team. The master instructed the OOW to start the bow thrusters and he pulled the port and starboard CPP control levers to 50% astern pitch. Starting the bow thrusters took less than 10 seconds, and the OOW watched as the master took control of the bow thrusters on the starboard console. Helm control was also transferred to the master by the QM, who then left the bridge.

As the OOW went to 'centre the sticks', which involved moving the CPP controls on the central console from their current setting to zero pitch, he noticed the port 'in-command' light was still illuminated. He shouted to the master that '…he had not got the port engine', which the master understood to be a further reference to the bow thrusters. The OOW reiterated that the port engine was not in the master's control and, on realising the port engine was still driving ahead, the master instructed the OOW to 'zero the port stick' at the central console. The master put the starboard CPP lever to 100% astern, and the port lever to zero to align with the centre console. Holding down the port 'in command' switch he saw the 'in-command' light illuminated brighter, and applied 100% astern on the port CPP lever.

During this time, *Isle of Mull*'s bow had started to swing to starboard due to the differential thrust of the propeller shafts and the wind catching the starboard quarter. The master therefore started the bow thrusters to port to try and turn the ship that way, but quickly realised that *Isle of Mull* was not slowing or turning to port fast enough. Concerned that the ship would hit *Lord of the Isles*, which was alongside Oban Railway Pier, squarely amidships, the master turned off the bow thrusters to allow full engine power to the CPPs. The master told those on the bridge to 'hold on' as an impact was now imminent. The chief officer looked down from the bridge and noted that the mooring team had cleared the foredeck. At about 1905*, Isle of Mull*'s bow glanced off *Lord of the Isles*, before making heavy contact with the pier at an estimated speed of 4 knots. The damage sustained to *Isle of Mull* is shown in **Figures 2-4**.

Figure 2

Bow visor damage

Figure 3

Port focsle damage

Figure 4

Foscle damage

The chief officer then left the bridge to don his boiler suit and investigate the damage. The master manoeuvred the ship away from the pier and then berthed her alongside.

1.4 ENVIRONMENTAL CONDITIONS

The accident occurred during the hours of darkness, nautical twilight having occurred at 1730. The weather was overcast with drizzle and the wind was south westerly force 5-6. The sea was slight and the visibility was poor to moderate. High water at Oban was at 1931.

1.5 KEY PERSONNEL ON THE BRIDGE

The master was aged 58. He had worked at sea for 18 years on a variety of ships, before running his own company ashore for 10 years. After revalidating his master's ticket, he rejoined Caledonian MacBrayne in 1990 as a second officer, and had progressed to master in 2000. He had been the first officer on *Isle of Mull* for 6 years and, at the time of the accident, master for 1 year. During this time, *Isle of Mull* had primarily operated on the Colonsay and Craignure routes from Oban, and occasionally on the Outer Isles routes.

The master joined the ship on the day of the accident after a 4 week leave period. His normal working routine was 2 weeks on, 2 weeks off, 2 weeks on and then 4 weeks off. He was well rested and not taking any medication. He had not consumed alcohol for over a month.

The second officer was aged 36 and had started his seagoing career as a fisherman before joining the merchant navy in 1992. He began working for Caledonian MacBrayne in 1994 as an able seaman, became a second officer in 1998, and obtained his chief officer's ticket in 2003. Since June 2003, he has been a relief second officer, serving on various major ships of the Caledonian MacBrayne fleet. During 2004, he had completed four periods of two week duties on *Isle of Mull*; the period in May being with the same master as during this accident, and the most recent being in September.

The second officer had also joined the ship on the day of the accident after a leave period.

1.6 PROPULSION AND MANOEUVRING CONTROLS

1.6.1 Propulsion

Isle of Mull had two shafts with CPPs that were driven at constant rpm by medium speed diesel engines through a gearbox. The thrust put into the water was determined by the pitch set on the CPPs. There was a power take-off from each gearbox to supply the bow thrusters. When the bow thrusters were in use, a physical link limited the CPP pitch available to 87% ahead and 90% astern, in order to prevent the main engines being overloaded.

In addition, the propulsion system would automatically reduce pitch if the main engine was nearing overload. At the time of the accident, the electronic card that controlled automatic pitch-shedding for the starboard CPP was believed to be defective, apparently reducing pitch erratically in only moderate head seas when 100% was demanded. The master was aware of this problem from his handover notes, but was unaware, until a casual conversation with the chief engineer while on passage to Colonsay, that the engineering department was removing the defective card while on passage and replacing it for berthing operations. The bridge team had not been made aware of this action.

1.6.2 Bridge controls

The controls for the propulsion system, and their layout on the bridge, are shown in **Figures 5-7**. When control of the two CPPs was at the central console, the ‘in command’ switches beneath the pitch levers were illuminated. To transfer control of the CPPs from one console to another, the operator held down the unlit ‘in command’ switches at the console they wished to use. They then moved the pitch levers with their other hand until the ‘in command’ switches were illuminated. At that point, the ‘in command’ switches on the console from which control had been taken would not be lit. It was normal bridge routine to zero the pitch levers at the centre console once control had been transferred to one of the wings.

Only *Isle of Mull* and *Lord of the Isles* required the pitch levers to be synchronised before changing control to a different console. All other Caledonian MacBrayne vessels had a different system. After the accident, the control system was inspected for defects but none were found. However, since this accident, there has been an incident where control of the port engine appeared to jump from a wing control console to the centre console while manoeuvring off a berth. The problem was noticed quickly and rectified. Again, the system was inspected and no faults were found.

The bow thrusters could only be started at the central console. Transfer of control for the bow thrusters was achieved by pressing the ‘control here’ switch on the panel desired. The helm was transferred by the QM turning a switch on the central console to the desired control point **(see Figure 5)**.

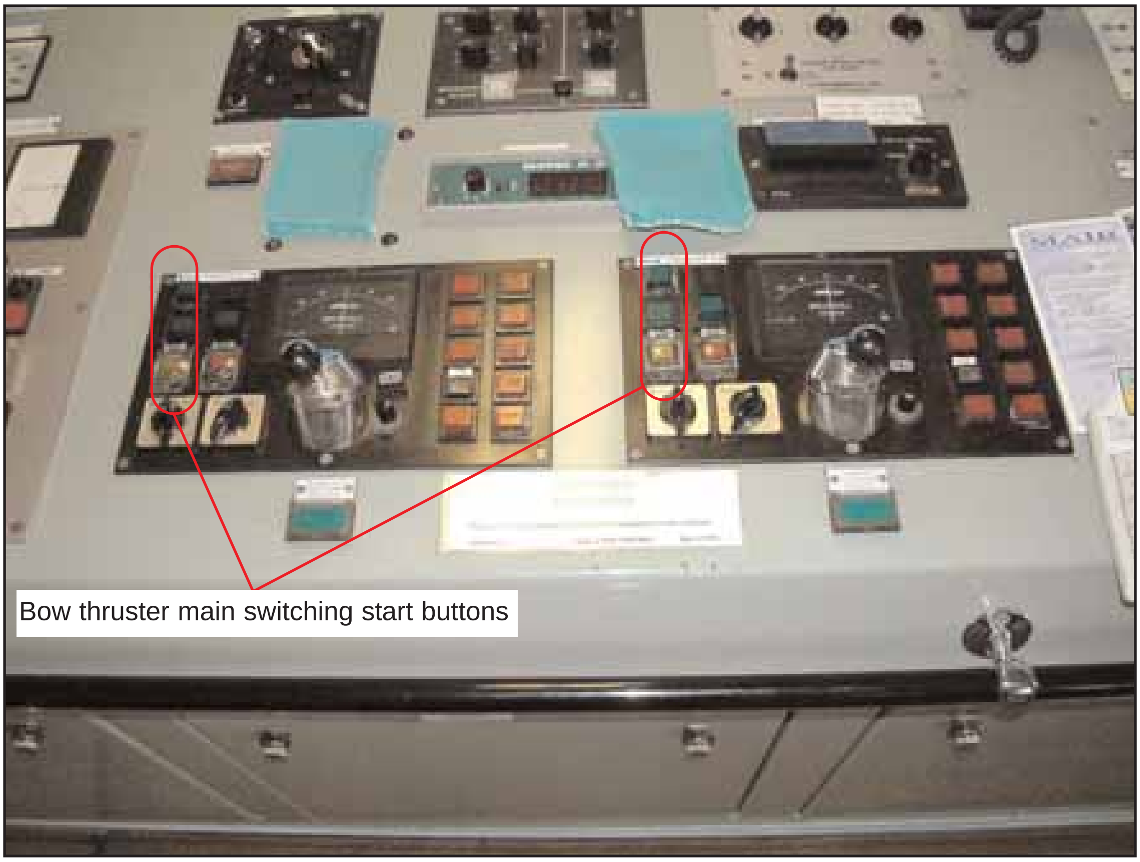
1.6.3 Dimmer controls

Instrument illumination was a problem at night on the bridge of *Isle of Mull,* and panel dimmer switches were usually turned down to preserve the OOWs’ night vision. On the wing consols, the four dimmer knobs directly above the pitch levers controlled the brightness of the illumination of the panel **(see Figure 8)**. The knobs operated in pairs, one pair controlling the starboard side of the panel and the other pair the port side. One of the knobs in the pair controlled the brightness of the gauges for the engine revolutions and the pitch setting. The other knob controlled the brightness of the switches beside the levers, and the ‘in command switch’ for that side. It was therefore possible to have the ‘in command’ switches illuminated at different intensities. With the dimmer knob adjusted to restrict the light from the engine revolutions gauge, the pitch gauge was very difficult to see.

Figure 5

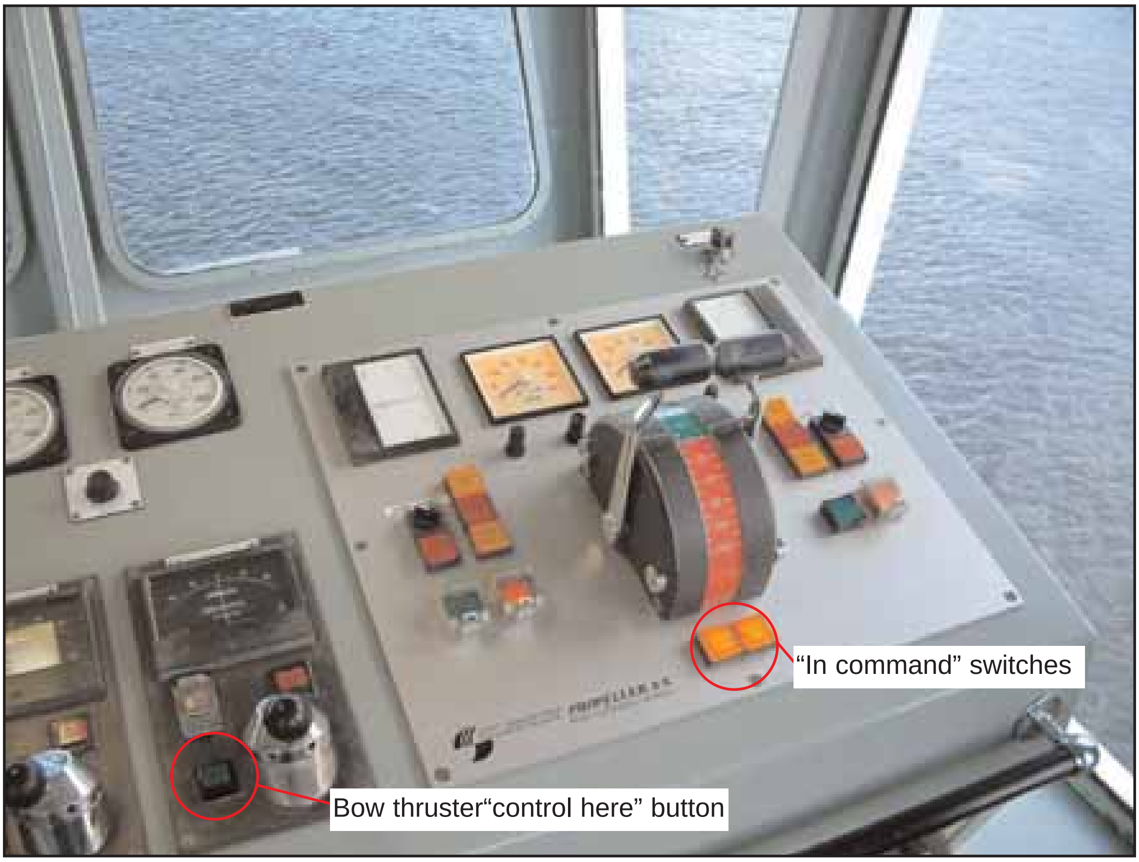
Central control console

Figure 6



Bow thruster, central control console

Figure 7



Starboard wing control console

Figure 8

Dimmer controls

1.7 SAFETY MANAGEMENT SYSTEM

1.7.1 Company background

Effectively in existence since 1851, Caledonian MacBrayne has grown from an initial fleet of 8 paddle steamers, to operating 26 ferry routes around Scotland using 13 major ships and 18 smaller vessels. As a vital public service, the company was owned and subsidised by the Scottish Executive. However, at the time of the accident, the future of Caledonian MacBrayne was uncertain as EU regulations about state aid were being reviewed to determine whether the routes should be competitively tendered.

1.7.2 Safety management

The Merchant Shipping (International Safety Management (ISM) Code) Regulations 1988 came into force on 1 July 1998. The ISM code lays down the requirement for companies to develop, implement and maintain a safety-management system. The ISM Code Section 1.2.1 defines the objectives of such a system, which is to:

.1 *provide safe working practices in ship operation and a safe working environment;*

.2 *establish safeguards against all identified risks; and*

.3 *continuously improve safety management skills of all personnel ashore and afloat, including preparing for emergencies related both to safety and environmental protection.*

Although only operating domestic routes, in 1995 the company decided to develop a safety management system in accordance with the ISM Code. For major vessels, the system consisted of a series of generic company procedures, flowing from company ISM policy, that were common to all vessels. Each vessel was required to develop its own working instructions based on these company procedures. For the small vessels, a common operations manual, encompassing company procedures, had been produced. This had proved so successful that a major vessel operations manual was under development.

1.7.3 DPA/marine manager’s role

The Designated Person Ashore (DPA) is a vital part of the ISM system, providing a link between the company and the ships; monitoring the safety aspects of ship operations; and ensuring adequate resources and support are available as required. Companies are required to develop instructions and procedures to ensure the safe operation of their ships and protection of the environment, and establish a process for internal audit.

The Caledonian MacBrayne ship management team, as shown in **Annex B**, split the ferry operation into north and south sectors, each covered by a marine manager who was also the DPA for their sector. Each marine manager acted as deputy to the other. Both marine managers were experienced masters from the Caledonian MacBrayne fleet and had shore- based management experience.

Shortly before the accident, the marine managers had begun conducting ship inspections, divorced from ISM audits, with the aim of completely inspecting a ship within 6 months of the annual dry docking. Included in some inspections would be an emergency scenario determined by the marine manager, which was in addition to the emergency drill plan that the ship had to complete.

1.7.4 Safety manager's role

The Caledonian MacBrayne Safety, Environmental Quality and Security department was separate from the ship management team. Responsible for policing the company's ISM system, they conducted internal audits to ensure the ISM system was being followed and was effective. The team consisted of three trained auditors, including one with nautical expertise.

1.7.5 Safety culture

The company had seen a steady improvement in its safety culture since the introduction of the ISM system. Crew motivation was seen as a key factor in ensuring safety awareness was maintained. This was primarily achieved by the safety department and marine managers getting onboard the ferries, witnessing events and talking to the crews. There had been occasional 1-2 day conferences in the past where the Caledonian MacBrayne masters, chief officers and chief engineers had met and discussed various safety and other issues. Although a useful forum, they had proved difficult to arrange and no conference had been held in 2004.

Beyond the company procedures, there was a significant amount of freedom for masters to run their ships as they saw fit. Shore side managers were reluctant to impose too many procedures and checklists on ships' crews, as it was believed this detracted from the professionalism of the crew and might stifle initiative. Many of the operating procedures onboard *Isle of Mull* had developed over the years and, while not laid down as 'working instructions', were nevertheless acknowledged as common routines.

Over familiarity had been recognised as a potential hazard, and attempts had been made to interchange crews to ensure fresh eyes and minds were watching bridge practices, and to spread experience across the fleet. However, this initiative is proving difficult to implement for personnel reasons.

1.8 VOYAGE PLANNING

SOLAS Chapter 5 Regulation 34 requires masters to conduct voyage planning in accordance with IMO guidelines. Annex 25 of SOLAS Chapter 5 includes these guidelines, and Annex 24 provides further notes on voyage planning. The following extracts from Annex 24 paragraph 1, show some of the measures to be adopted:

a) *ensure that all vessel's navigation is planned in adequate detail with contingency plans where appropriate;*

b) *ensure that there is a systematic bridge organisation that provides for:*

   i) *comprehensive briefing of all concerned with the navigation of the vessel;*

   ii) *close and continuous monitoring of a vessel's position…..;*

   iii) *cross-checking of individual human decisions so that errors can be detected and corrected as early as possible.*

The marine managers maintained the voyage plans for the various ferry routes. To update a voyage plan, the marine manager would request a master who was on the route at that time to review the voyage plan, in consultation with his colleagues, and report back. There were no senior masters assigned to the routes as there was a need to keep a high degree of flexibility of operation in the fleet.

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

Fatigue was not considered a contributory factor to this accident due to those on watch being well rested prior to the accident.

2.3 ACCIDENT SEQUENCE

The accident can be simplified into a chain of the main events as follows:

- Failure to start the bow thrusters in good time.
- Incomplete transfer of CPP control to the bridge wing console.
- Distraction on discovering bow thrusters not started, and subsequent starting and transfer of bow thrusters control to bridge wing console.
- Distraction on discovering port CPP control still at centre console, and subsequent transfer of control to bridge wing console.
- Vessel glanced off *Lord of the Isles* and hit pier, bow on.

2.4 ARRIVAL ROUTINE

Standard voyage plans had been produced and were reviewed annually for the numerous routes conducted by Caledonian MacBrayne ferries. Officers new to a route would consult the plans, but due to the routine nature of the passages, the plans were not referred to every trip. Neither the standard voyage plans, nor the master's standing orders, specified a point by which arrival checklists must be completed, this being left to the ships' officers to decide. Although it would appear logical for arrival checklists to be completed with sufficient margin to accommodate emergencies, on this occasion, the failure to ensure the bow thrusters were running in good time initiated a chain of events that led to the accident.

The lack of a comprehensive pre-arrival routine meant that other key checks were conducted in an ad hoc manner or taken on trust. As *Isle of Mull*'s routes often included confined waters and strong tidal streams, the anchors were permanently 'cleared away' ready for use, though the OOW had to contact the foredeck team by radio to get them standing by the anchor. In general, the mooring teams, although in radio contact, operated autonomously, and were expected by the bridge team to be in place when required. In rough weather and more hazardous harbours, mooring teams would report in by radio when in position, but for normal entries to Oban this was not the case. Any passage will have sections which are more hazardous to navigation than others, and these sections, along with appropriate actions to be taken, should be highlighted in passage plans, and confirmation that mooring teams are closed-up should be part of the checklist.

2.5 BRIDGE MANAGEMENT

2.5.1 Monitoring of the master by the OOW

Good bridge management will ensure that a mistake by any one person does not go unnoticed or unchecked. SOLAS V Annex 24 requires a systematic bridge organisation for cross-checking decisions and early detection of errors. The requirement for the OOW to monitor the actions of the master was laid down in the master's standing orders, held on the bridge. How it was actually to be carried out was left to the master and OOW involved. Clearly, in this accident, the monitoring of the master by the OOW was ineffective.

The bow thrusters not being started was the catalyst for this accident. The arrival checklist did not specify who should start the bow thrusters, but it was normal practice for the master to carry this out. It could be suggested that the OOW should have spotted this mistake sooner, but he was completing the arrival checklist, and the master was standing between him and the bow thruster controls at the time they were normally started. The OOW noted the bow thrusters had not been started as soon as he took up the position vacated by the master.

The master was conning the ship at the time of the accident, navigating by eye on a route that was very familiar. He had remained at the centre console until the final approach to the pier to maintain a good perspective of the ship's heading, and had moved to the bridge wing to finish the port turn and the manoeuvre astern to the link span. Once the turn was started at the end of the leg towards the lighthouse pier, the master navigated by eye and feel with little reference to instrument gauges.

To be able to monitor effectively, the OOW must know what the master is intending to do. Expecting the OOW to know the normal routine was not sufficient, especially as the OOW was a relief officer who had just joined the ship from leave. A bridge team briefing prior to entering harbour would have ensured the bridge team was aware of the master's intentions, allowing more effective monitoring of the master's actions. The best means of monitoring must also be decided between the master and OOW. In this case, the OOW had been left to devise his own method of monitoring.

2.5.2 Control transfer

Transferring control from the centre console to the bridge wing consoles was a regular and not unduly complicated procedure. However, the manner in which control was transferred to the bridge wing, in this accident, was very relaxed, with both master and OOW carrying out various operations, but neither confirming the status of critical controls.

The only method used by the master to confirm he had control of the CPPs was to check the ‘in-command’ switch on his console. The pitch gauges were not used to confirm that pitch demands were being applied. Neither was there any formal confirmation by OOW or master that control had been passed.

Positive reporting when important tasks had been completed would have ensured all personnel on the bridge knew what actions had been completed, and what remained to be done. For example, on a previous ship the master had required the OOW to call out the speed of the vessel as they approached the berth, but he had not considered applying a similar process on *Isle of Mull*. Given the critical importance of maintaining control of the vessel in confined waters, improved and formalised cross-checking of key procedures would prevent a reoccurrence of this accident.

2.5.3 Bridge discipline

On the leg towards the lighthouse pier the master had been discussing the recent Asian Tsunami with those on the bridge - including the chief officer who had come to the bridge to watch the entry - and it was possibly this that had distracted him from starting the bow thrusters as normal.

Good bridge practice should ensure that external distractions were kept to minimum at critical stages on the ferry’s passage, to allow the bridge team to remain focussed on the tasks of navigating and manoeuvring the ship. Arrangements should exist to ensure that visitors and non-duty personnel do not interfere or divert the duty team from their tasks.

2.5.4 Emergency routine

Caledonian MacBrayne procedures required emergency drills to be conducted in accordance with the drill plan held onboard. However, *Isle of Mull* did not have specific drills for engine and steering failures. Although not strictly relevant to the failures experienced in the lead up to the accident, familiarity with such procedures might have helped the master and OOW resolve the problems faster.

No announcement was made on the ship’s tannoy when the impact was imminent. It is fortunate that on this voyage there had been no passengers onboard, as they might well have been moving down to the car deck at the time of the contact and, thus, injuries could have been extensive. This notwithstanding, the ship's crew were not made aware of the impending collision, and certainly would have benefited from a warning. Considering the likelihood of heavy contact with a berth, be it as a result of heavy weather or a propulsion control problem, it is important that consideration is given to developing an internal warning system that can be activated at very short notice. In this way, a significant number of injuries could be avoided in the event of a contact during berthing or a collision.

2.5.5 Bridge and engine room liaison

Although it is thought unlikely to have contributed to this accident, the action by the engineering department to remove the defective port CPP pitch-control card during passage should have been known to the bridge team. Further, that the engineers were replacing the defective card for harbour manoeuvring, appears illogical, since it is during just such periods that the bridge team might require the full range of power at short notice. Liaison between the deck and engineering departments was ineffective in this instance, with no meetings or briefings held onboard at which such issues could be discussed.

2.6 ERGONOMICS

Although tighter bridge procedures would reduce the chance of this accident reoccurring, the ergonomics of the bridge controls onboard *Isle of Mull* were far from ideal.

In this accident, the master believed the port CPP 'in-command' switch was illuminated when it was not, leading him to assume he had positive control of both shafts. Turning all illumination down to a low setting during passage, in order to preserve the OOW's night vision, was a reasonable precaution. However, because the port and starboard 'in command' lights were on separate circuits, and it was possible to turn the dimmers low enough to virtually extinguish either 'in command' switch, the panel illumination controls might have directly contributed to the master's confusion.

The pitch gauge, that would have shown the master that his port CPP was not responding as expected, was poorly illuminated. The same dimmer control altered the brightness of both engine revolutions and CPP pitch gauges. To reduce the light shining from the engine revolution gauge, the dimmer was turned down such that the pitch gauge was very difficult to see. Possibly as a result of this, referring to the pitch gauge was not part of the normal routine at night, reliance instead being placed on illumination of the 'in command' switch and the OOW monitoring the control that had been vacated by the master.

Finally, the lack of tell-backs at the centre console made it extremely difficult for the OOW to monitor the actions of the master, and to check that the control demands applied were being responded to correctly. If the OOW is not able to monitor the master effectively from a separate console, consideration should be given to him standing beside the master once he has confirmed that control has been successfully transferred to the master's console.

2.7 ROUTINE AND FAMILIARITY

One of the greatest dangers associated with repetitive operations such as short ferry routes, is that familiarity can lead to complacency and bad practice. When a vessel has successfully achieved hundreds of uneventful passages and berthing operations, it is very difficult to remain vigilant and alert to the risks involved.

It is also possible that the relaxed nature in which the crew entered Oban Bay on the evening of the accident was due, in part, to it being the last passage of the day and that there were no passengers onboard. Had it been a normal passage, bridge personnel would have had the additional roles of unloading to worry about, and might, therefore, have been more focussed on the task at hand.

At the time of the investigation, Caledonian MacBrayne was considering crew rotation as a means of ensuring personnel were kept fresh and bad practice was minimised, with joining crew members being encouraged to comment on existing routines. The switching of crews between vessels would probably have the required effect, but it could also lead to confusion and errors where differences exist between ship procedures. Generic fleet procedures help to mitigate this, but ship specific issues must also be considered and accommodated in crew joining procedures.

2.8 POSSIBLE CPP CONTROL FAULT

The precise reason why control of the port CPP was not transferred to the starboard bridge wing is unknown. Since this accident, there has been an incident where control of the port CPP has transferred from the wing to the centre console for unknown reasons. It is possible that a problem in the control system has led to control jumping from the wing console back to the centre console, but inspections by sub contractors after both incidents have been unable to find any faults. A new electronic control card has since been fitted, for another intermittent fault, and new ‘in command’ switches have been fitted, which have provided improvements in the process of transferring CPP control.

Notwithstanding the cause, it is essential that bridge team monitoring procedures are improved to ensure faults such as these are spotted and corrective action taken in good time.

2.9 APPLICATION OF ISM

The Caledonian MacBrayne ISM system started development in 1995 and had enabled a steady improvement in safety since then. A generic system had been developed and applied across the fleet, leaving ship’s crews to develop their own working instructions and procedures for ship specific issues. This common approach to procedures enabled crew transfer and flexibility of operation which was vital to ensuring a regular ferry service was maintained. However, the reluctance by Caledonian MacBrayne's shore management to impose additional procedures and checklists on ship crews might be due to their misunderstanding the principles of ISM; specifically, procedures should only be developed where they are needed and aid safety. Following numerous uneventful arrivals at Oban, the bridge team had slipped into poor practices that worked well provided nothing went wrong, but which provided no margins for error.

In this accident, the procedure for arriving in Oban was unclear, not documented and much was assumed by the bridge team as a result of routine.

- There was little by way of contingency planning.
- The arrival checklist, although a useful tool, was of no benefit unless it was completed by a set point. The set point needed to be defined and included in the voyage plan or master's standing orders.
- As there was no written procedure or pre-harbour briefing by the master, the OOW was unable to monitor the actions of the master effectively.
- When watchkeepers are rotated as frequently as they were by Caledonian MacBrayne, it is important that OOW duties and responsibilities are clearly laid down and understood.

The marine managers and safety department had conducted audits and witnessed bridge operations, but the shortcomings on *Isle of Mull,* highlighted above, were not identified. This might have been due, in part, to the marine managers having previously been company ferry masters themselves. Also, the commendable overall lack of incidents in the company might have allowed some shortcuts to become the accepted norm. Training of the marine managers in safety auditing, or an independent review of bridge operations, would have enabled some of the normal practices to be questioned, and either re-validated or amended as necessary.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES

The following safety issues have been highlighted by the investigation. They are not listed in any priority order.

1. Neither the passage plan, nor the master's standing orders, included a defined point by which time the harbour arrival checklist must be completed. [2.4]

2. There was a strong reliance on being able to contact a member of the foredeck crew by radio in the event of having to let go anchors. [2.4]

3. The monitoring of the master's actions and decisions by the OOW was not effective. [2.5.1]

4. There was no bridge team briefing by the master to inform his bridge team of his intentions. [2.5.1]

5. There was no positive reporting when important tasks had been completed by the bridge team. [2.5.2]

6. Insufficient checks were carried out to ensure propulsion control had been transferred to the bridge wing. [2.5.2]

7. The master was distracted at the time when he would have normally switched on the bow thrusters. [2.5.3]

8. No safety announcement was made when contact with the pier became inevitable. [2.5.4]

9. The bridge team was unaware that the defective automatic pitch-shedding control card was being removed while on passage and replaced for berthing. [2.5.5]

10. The dimmer controls on the bridge did not enable optimal viewing of critical gauges and switches during the hours of darkness. [2.6]

11. Routine and over familiarity might have contributed to a decline in the standard of bridge procedures and awareness of potential emergencies. [2.7]

12. Internal audits of navigational practice had not highlighted any particular concerns about harbour arrival routines. [2.9]

SECTION 4 - ACTION TAKEN

4.1 ACTION TAKEN BY CALEDONIAN MACBRAYNE

Caledonian MacBrayne began its own investigation immediately after the accident. The following actions have been taken:

- All Caledonian MacBrayne vessels have reviewed their arrival and departure routines, and updated instructions and checklists where required. Passage plans are being updated to include a specified point by which the arrival checklist is to be completed, or the approach aborted. Mooring teams now also have to report to the bridge that they are in position.

- A positive reporting system has been put in place on all vessels. This has been monitored by shore management. The requirement for positive reporting has also been included in the ISM system, in the new Major Vessels Operations Manual.

- An instruction has been issued across the fleet regarding the need for good communication. Further, the Board of Directors has agreed that all senior officers should undergo bridge management team training, and this will be arranged by the marine training officer.

- The informal ‘on board management team’ meetings have been formalised within the ISM system, and the requirement will be included in the new Major Vessels Operations Manual.

- The technical director has instructed all officers (irrespective of discipline) of the need to ensure, not assume, that the master is informed when any operation is undertaken that will affect the operation of the vessel.

- The defect reported with the automatic pitch-shedding control card has been reviewed by the technical director, and he is now satisfied that appropriate corrective action has been taken.

- The contractor for the propulsion controls, at the request of Caledonian MacBrayne, is to carry out the necessary modifications to the dimmer controls to ensure that similar light intensities for all controls can be achieved. They are also investigating the possibility of an audible alarm system for use when transferring control using the ‘in command’ switches.

- The internal audit practice in respect of navigation has been revised by Caledonian MacBrayne in light of this accident. The marine managers have been instructed to look closely at passage planning and navigation practices during ship visits.

- Emergency collision drills are being reviewed and revised to ensure a safety announcement is made to crew and passengers.

SECTION 5 - RECOMMENDATIONS

Due to the positive actions already taken or in hand by Caledonian MacBrayne, there are no additional recommendations.

Marine Accident Investigation Branch
July 2005

ANNEX A

Arrival/Departure Checklist

29/12/04

IOM /CL/14.REV3

Arrival Checklist

Call Master	✓
Broadcast VHF CH16 (Oban)	✓
Hand Steering. Two Pumps on	✓
Stand By Engines	✓
Fin Status	✓
Stop Vent Fans	✓
Start Hydraulic pumps	✓
Water Integrity Switch to harbour	✓
Visor/Ramp Switch to harbour	✓
Thrusters started	
Arrival Message	
Confirm Tx of control to bridgewing	

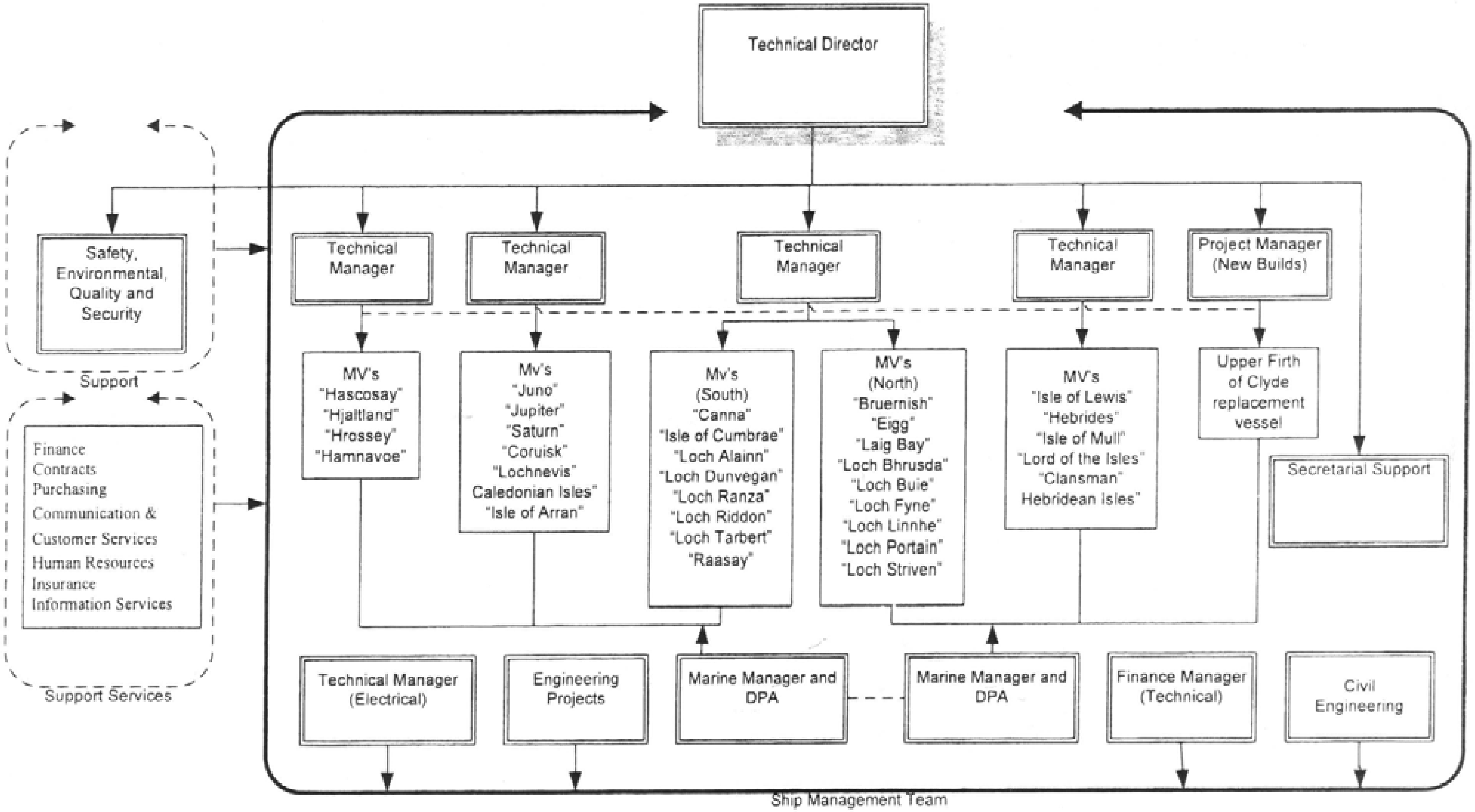
Departure Checklist

Bow/Stern ramp secure	
Gangway Secure	
Stability printed	
Figures passed ashore	
S.B.E. - Thrusters Started	
Two Steering motors on	
Departure Announcement	
VHF Broadcast Ch16 (Oban)	
Water integrity Panel to Sea Voyage. Key Removed	
Visor Ramp switch to Sea Voyage	
Hydraulic pumps off	
Fans on	
Full Away	

Signature	Time

ANNEX B

Caledonian MacBrayne Technical Director's Department Structure



Notes: -
1. DPA has direct access to Managing Director.
2. Marine Managers, are head of discipline for marine profession and have direct report line to Technical Director.
3. Technical Manager (Electrical) and Finance Manager offer service to all cells.

- - - - - - Co-operation/Co-ordination

Caledonian MacBrayne
Ship Management Team
October 2004
Organisation Chart SM01