



Office of Transport Safety Investigations

FERRY SAFETY INVESTIGATION REPORT

STEERING LOSS *OCEAN RIDER*

SYDNEY HARBOUR

5 MAY 2016



FERRY SAFETY INVESTIGATION REPORT

STEERING LOSS *OCEAN RIDER*

SYDNEY HARBOUR

5 MAY 2016

Released under the provisions of
Section 45C (2) of the *Transport Administration Act 1988* and
Section 46BBA (1) of the *Passenger Transport Act 1990*
Investigation Reference 04729

Published by: The Office of Transport Safety Investigations
Postal address: PO Box A2616, Sydney South, NSW 1235
Office location: Level 17, 201 Elizabeth Street, Sydney NSW 2000
Telephone: 02 9322 9200
Accident and incident notification: 1800 677 766
Facsimile: 02 9322 9299
E-mail: info@otsi.nsw.gov.au
Internet: www.otsi.nsw.gov.au

This Report is Copyright©. In the interests of enhancing the value of the information contained in this Report, its contents may be copied, downloaded, displayed, printed, reproduced and distributed, but only in unaltered form (and retaining this notice). However, copyright in material contained in this Report which has been obtained by the Office of Transport Safety Investigations from other agencies, private individuals or organisations, belongs to those agencies, individuals or organisations. Where use of their material is sought, a direct approach will need to be made to the owning agencies, individuals or organisations.

Subject to the provisions of the *Copyright Act 1968*, no other use may be made of the material in this Report unless permission of the Office of Transport Safety Investigations has been obtained.

THE OFFICE OF TRANSPORT SAFETY INVESTIGATIONS

The Office of Transport Safety Investigations (OTSI) is an independent NSW agency whose purpose is to improve transport safety through the investigation of incidents and accidents in the rail, bus and ferry industries. OTSI investigations are independent of regulatory, operator or other external entities.

Established on 1 January 2004 by the *Transport Administration Act 1988*, and confirmed by amending legislation as an independent statutory office on 1 July 2005, OTSI is responsible for determining the contributing factors of accidents and to make recommendations for the implementation of remedial safety action to prevent recurrence. Importantly, however, OTSI does not confine itself to the consideration of just those matters that contributed to a particular accident; it also seeks to identify any transport safety matters which, if left unaddressed, might contribute to other accidents.

OTSI's investigations are conducted under powers conferred by the *Transport Administration Act 1988* and *Passenger Transport Act 1990*. Additionally, all OTSI publications that are considered investigation reports are also conferred by this Act. OTSI investigators normally seek to obtain information cooperatively when conducting an accident investigation. However, where it is necessary to do so, OTSI investigators may exercise statutory powers to interview persons, enter premises and examine and retain physical and documentary evidence.

It is not within OTSI's jurisdiction, nor an object of its investigations, to apportion blame or determine liability. At all times, OTSI's investigation reports strive to reflect our balanced approach to the investigation, that properly explains what happened, and why, in a fair and unbiased manner.

Once OTSI has completed an investigation, its report is provided to the NSW Minister for Transport and Infrastructure for tabling in Parliament. The Minister is required to table the report in both Houses of the NSW Parliament within seven days of receiving it. Following tabling, the report is published on OTSI's website at www.otsi.nsw.gov.au.

CONTENTS

TABLE OF FIGURES	II
EXECUTIVE SUMMARY	III
PART 1 FACTUAL INFORMATION	1
Introduction	1
Location	1
Incident	1
Environmental information	4
Vessel information	5
Master and Crews	6
<i>Ocean Rider</i> steering system	6
PART 2 ANALYSIS	9
Introduction	9
Incident report and crew interview	9
Examination of the ferry	10
Hydraulic system contamination and corrosion	11
Electrical issues	13
Related occurrences	19
Remedial actions taken	20
PART 3 FINDINGS	21
Contributory factors	21
Other safety factors	21
PART 4 RECOMMENDATIONS	22
Manly Fast Ferry	22
Submissions	22

TABLE OF FIGURES

Figure 1: Location Port Jackson-Sydney Harbour	1
Figure 2: Both <i>Ocean Rider</i> and <i>Collaroy</i> tracking west in proximity to Fort Denison	2
Figure 3: <i>Ocean Rider</i> turning abruptly to starboard	3
Figure 4: Main helm position	4
Figure 5: <i>Ocean Rider</i>	5
Figure 6: <i>Collaroy</i>	6
Figure 7: <i>Ocean Rider</i> dash layout	7
Figure 8: Steering system	8
Figure 9: Engine start / Stop switches	10
Figure 10: Corroded return spring and spool valve	12
Figure 11: Corroded steering components	13
Figure 12: B-Joystick wire passing through chair base without insulating grommet	14
Figure 13: Unsecured wires under dash board	15
Figure 14: Unsecured items under dash	16
Figure 15: Port wing controls 6 May 2016	16
Figure 16: Port control on 8 June 2016	17
Figure 17: Liquid residue near main steering controls	17
Figure 18: Salt encrusted DC distribution board	18

EXECUTIVE SUMMARY

On 5 May 2016 the Manly Fast Ferry (MFF) vessel *Ocean Rider* suffered a loss of control whilst overtaking the Harbour City Ferries (HCF) vessel *Collaroy*, bringing both vessels into close quarters.

The incident occurred near Fort Denison in Sydney Harbour. Both ferries were travelling from Manly to Circular Quay. *Collaroy* was carrying 479 passengers and a crew of six on board. *Ocean Rider* was carrying 290 passengers and a crew of three on board.

The loss of control resulted in the *Ocean Rider* turning sharply to starboard and towards the *Collaroy* narrowly avoiding a collision. There were no injuries or damage as a result of the incident.

The investigation found that the loss of control resulted from an intermittent fault in the *Ocean Rider*'s steering control system.

Ocean Rider recorded a number of steering faults and engine stalling incidents in the 12 months leading up to this incident.

Full details of the Findings and Recommendations of this ferry safety investigation are contained in Parts 3 and 4 respectively.

PART 1 FACTUAL INFORMATION

Introduction

- 1.1 At 0822¹ on 5 May 2016, the MFF *Ocean Rider* suffered a loss of control whilst overtaking the HCF *Collaroy* near Fort Denison in Sydney Harbour. Both ferries reportedly came within close quarters². The incident was reported directly to OTSI by a passenger on the ferry.

Location

- 1.2 The incident occurred approximately 75 metres (m) north-east of Fort Denison, Port Jackson (see *Figure 1*).



Source: Google maps

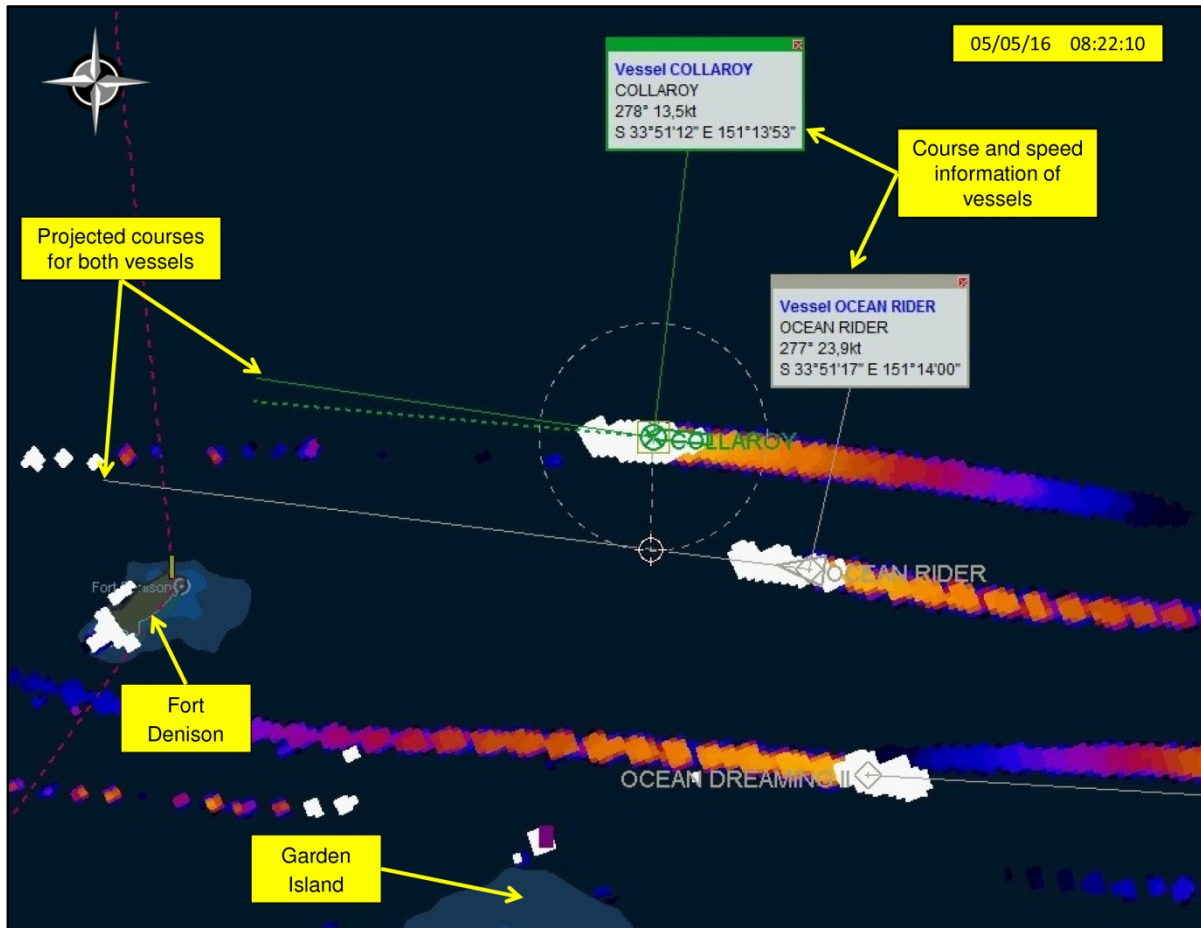
Figure 1: Location Port Jackson-Sydney Harbour

Incident

- 1.3 Both ferries were travelling inbound from Manly to Circular Quay. *Collaroy* was travelling at 13.5 knots with 479 passengers and a crew of six on board. *Ocean Rider* was travelling at 23.9 knots with 290 passengers and a crew of three on board (see *Figure 2*).

¹ Australian Eastern Standard Time in 24 hour format is used in this report.

² The *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* defines close quarter as a situation in which vessels pass each other, or a vessel passes another vessel, a person or an object, in such proximity that a reasonable person would conclude that in all the circumstances there was a risk of an imminent collision.



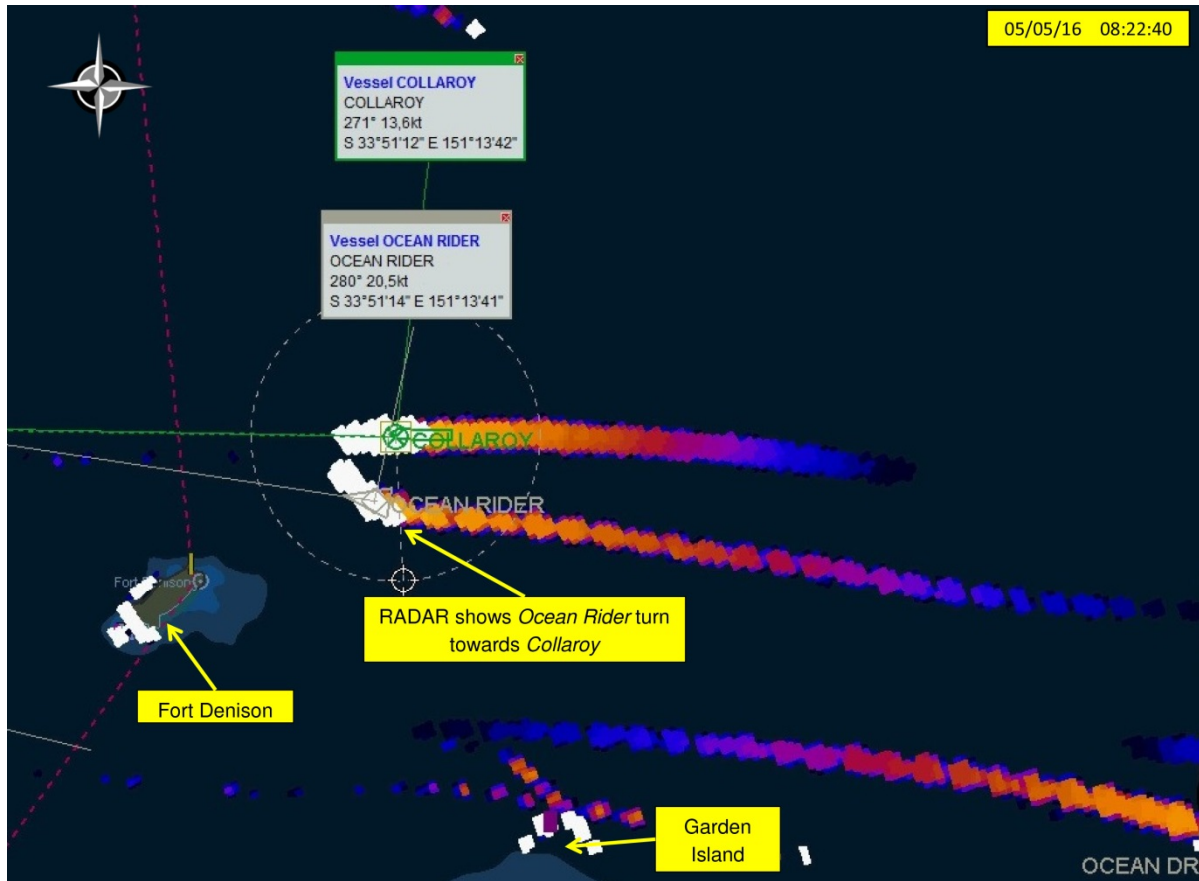
Source: Port Authority of NSW Vessel Traffic Service-Automatic Identification System (AIS)

Figure 2: Both *Ocean Rider* and *Collaroy* tracking west in proximity to Fort Denison

- 1.4 *Ocean Rider* was overtaking on *Collaroy*'s port³ side as both vessels approached Fort Denison. As *Ocean Rider* drew level with *Collaroy*'s bow, a loss of control resulted in the ferry turning abruptly to starboard⁴ (see *Figure 3*) and towards the *Collaroy*.

³ Port is the left side of the vessel when looking forward.

⁴ Starboard is the right side of the vessel when viewed from the rear.



Source: Port Authority of NSW Vessel Traffic Service - AIS

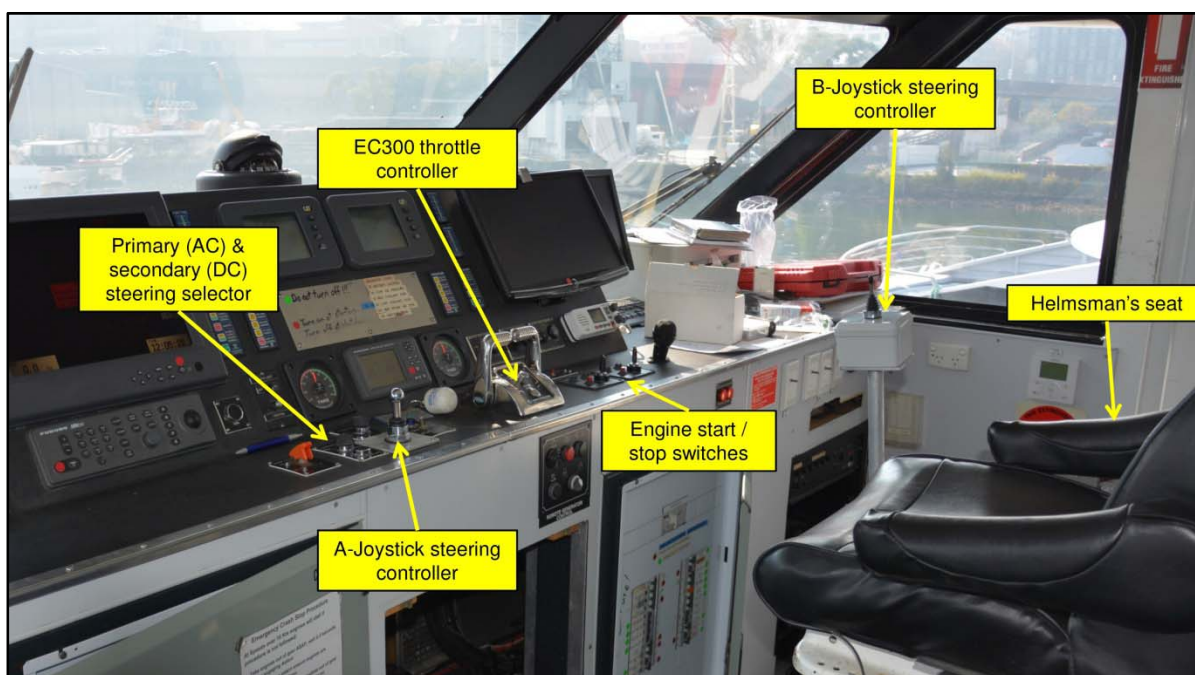
Figure 3: Ocean Rider turning abruptly to starboard

- 1.5 *Ocean Rider's* master placed both engine controls to astern⁵, however, both engines stalled. Concurrently, the master then isolated the auxiliary controls and switched the ferry's steering control from the primary to the secondary back-up steering system. The secondary steering did not respond and the ferry's twin rudders remained locked full over to starboard.
- 1.6 The mate, standing to the right of the master, was able to restart the port and then the starboard engines utilising the engine start / stop switches on the helm's dashboard (see *Figure 4*). The mate then selected astern gear which slowed and stopped *Ocean Rider* from colliding with *Collaroy*.
- 1.7 No alarms or warning lights were noted by the crew notifying them of any failure or engine shut down.
- 1.8 *Ocean Rider's* master then tested the steering by alternating between the primary and secondary systems. Control was regained by way of the secondary system and *Ocean Rider* was navigated to Circular Quay at a

⁵ Astern or Reverse

reduced speed. The ferry was secured to the wharf and passengers disembarked. No person was injured as a result of the incident.

- 1.9 *Ocean Rider's* master re-tested the steering systems alongside the wharf, confirming that both were operational. He then embarked passengers and conducted a delayed service to Manly. During this service the master reported the close quarters with *Collaroy* to MFF management. He was instructed to terminate the service and return *Ocean Rider* to the MFF Blackwattle Bay base at reduced speed.



Source: OTSI

Figure 4: Main helm position

Environmental information

- 1.10 On the day of the incident, Fort Denison recorded a high tide at 0641 of 1.74 m and a low tide of 0.29 m at 1251. At the time of the incident, the tide was ebbing⁶ and flowing in an easterly direction. It is likely that the tide would have had minimal effect on both ferries as both were heading into the tidal flow. At the time of the incident the weather was clear with good visibility. The sun was rising behind both ferries and did not affect the vision of either master.

⁶ Ebb tide (ebbing) is the seaward flow in estuaries or tidal rivers during a tidal phase of lowering water level.

- 1.11 The investigation concluded that the environmental conditions did not influence the navigation of the two ferries and did not contribute to the incident.

Vessel information

- 1.12 *Ocean Rider* (see Figure 5) is a high-speed ferry of aluminium construction operated by MFF. *Ocean Rider* is 29 m in length, with a beam of 8.1 m and a draft⁷ of 2.7 m. The vessel is powered by twin diesel engines. The engines provide drive to propellers through conventional gearboxes and shafts.
- 1.13 *Ocean Rider* was manufactured in Queensland and was surveyed⁸ to carry 297 passengers and three crew members. *Ocean Rider* had an operational speed of 28 knots⁹. At the time of the incident *Ocean Rider* was operating a fast ferry passenger service from Manly Wharf to Circular Quay.



Source: OTSI

Figure 5: *Ocean Rider*

- 1.14 *Collaroy* (see Figure 6) is one of four Freshwater Class ferries owned by the NSW Government and operated by HCF. *Collaroy* is 69.5 m long and 13 m in beam. *Collaroy* is a 'double-ended' ferry, with a centre-line propeller and rudder fitted at both ends. This configuration enables the ferry to be operated on return trips to dead end wharves without having to turn around.

⁷ Beam is the maximum width of the vessel, Draft is the deepest part at a given time.

⁸ Vessels in commercial use in Australia that require a Certificate of Survey and Operation must have regular survey inspections to ensure that they are compliant with National Standards.

⁹ A knot is a unit of speed equal to one nautical mile (1.852 km) per hour.

- 1.15 *Collaroy* is propelled by two diesel engines. Its normal service speed is 14 knots; *Collaroy* has a displacement of 1140 tonnes and has a maximum carrying capacity of 1100 passengers. *Collaroy* provides passenger services between Manly and Circular Quay.



Source: OTSI

Figure 6: *Collaroy*

Master and Crews

- 1.16 At the time of the incident, the master of *Collaroy* was an experienced master holding a Master 4 Certificate of Competency and a Certificate of Local Knowledge for operations in Port Jackson. *Collaroy*'s crew included an engineer and four general purpose hands (GPH).
- 1.17 *Ocean Rider*'s crew consisted of the master, first mate and two GPH. The master in addition to his Master 4 Certificate of Competency also held a Marine Engine Drivers Certificate Grade 2 (MED 2). Survey requirements allowed the ferry to operate without an engineer if the master was dual qualified with a MED 2.
- 1.18 All crew were holding current qualifications necessary to operate the ferry.

Ocean Rider steering system

- 1.19 *Ocean Rider* can be navigated from four control positions. These are the main A-Joystick control on the dash, the auxiliary B-Joystick and wing positions. The auxiliary positions can be isolated by a switch on the dash leaving only the A-Joystick active. The wing control positions are external to the wheelhouse, exposed to the elements and used mainly to berth the ferry.

- 1.20 *Ocean Rider* is primarily steered through the controller (B-Joystick) located next to the helmsman's seat, or alternatively through the dashboard controller (A-Joystick) adjacent to the EC300 throttle controller (see *Figure 7*).

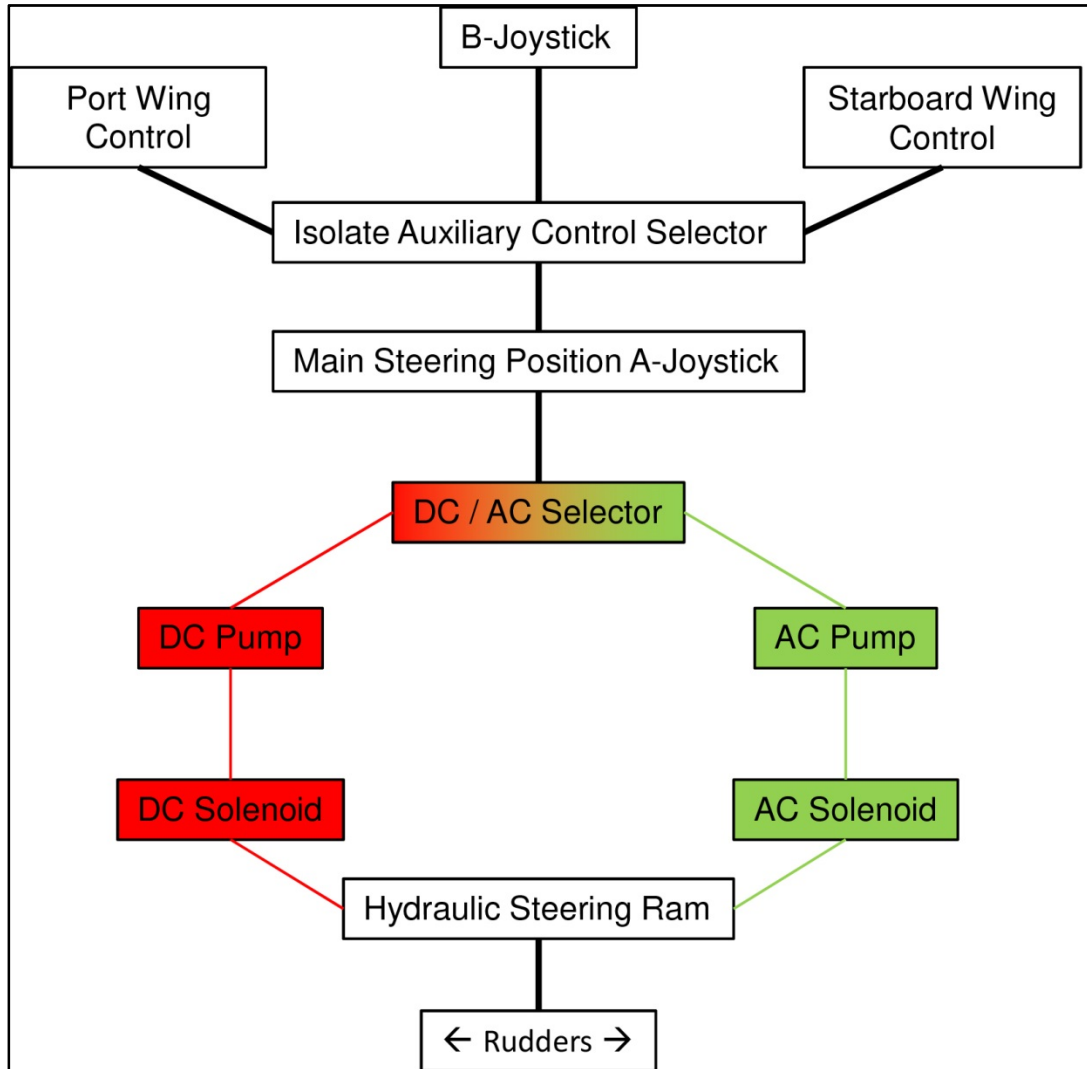


Source: OTSI

Figure 7: *Ocean Rider* dash layout

- 1.21 The master controls the speed of the ferry by means of levers on the EC300 throttle controls available at all three control stations. A master can utilise the throttle levers as a secondary means of steering the ferry by increasing or decreasing the port and starboard thrust.
- 1.22 The steering controllers send electrical signals to the ferry's hydraulic / mechanical steering systems. An electro-hydraulic solenoid directs hydraulic fluid under pressure to hydraulic rams attached to the rudder mechanism. This in turn moves the rudders in the direction determined by the input signal.
- 1.23 *Ocean Rider* is equipped with a 415 volt alternating current (AC) primary steering pump and a back-up 24 volt direct current (DC) secondary steering pump.
- 1.24 The master can swap between the primary and secondary steering systems through a dashboard mounted selector switch (see *Figure 7*).

- 1.25 *Ocean Rider* has two rudders, one at the stern of each hull. The rudders are moved by hydraulic pressure in unison. Their range of movement is 38° either side of the ferries centre line. Hydraulic fluid is pressurised by either of the two electric pumps, the primary AC or the secondary DC (see *Figure 8*).



Source: OTSI

Figure 8: Steering system

PART 2 ANALYSIS

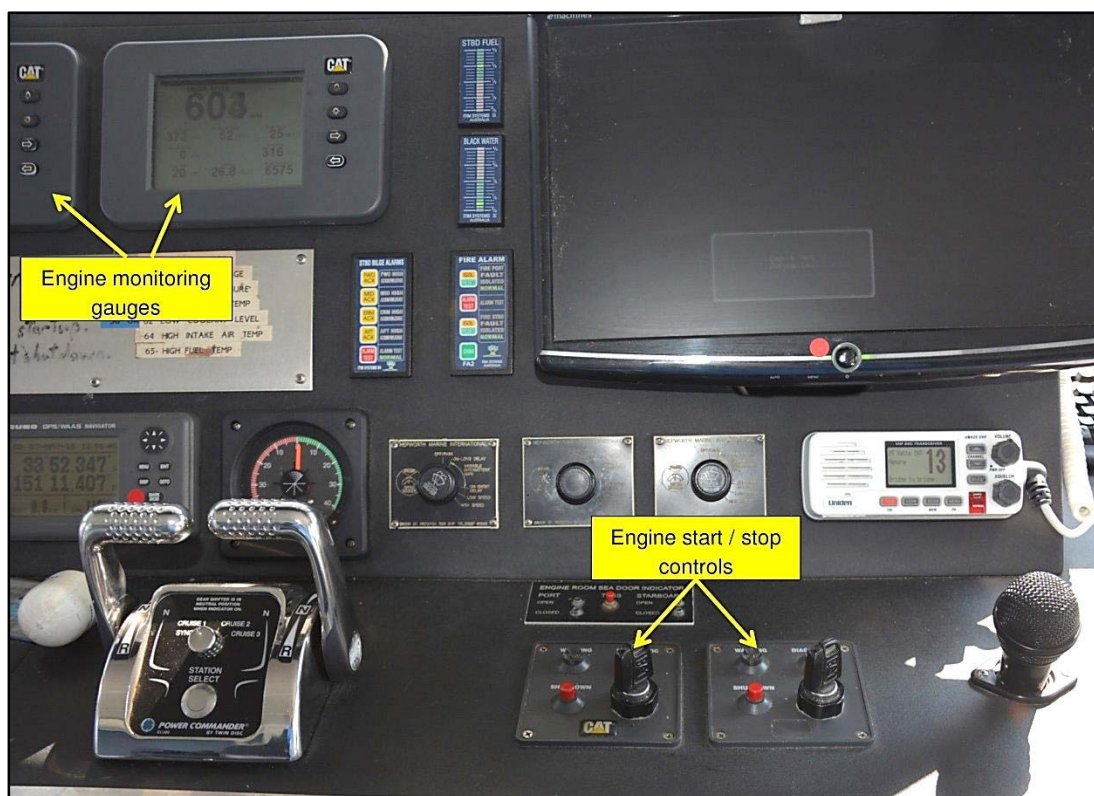
Introduction

The investigation focussed principally on the factors that contributed to the loss of control on the vessel *Ocean Rider*. The actions of the crew of the Collaroy were not examined.

Incident report and crew interview

- 2.1 Immediately after *Ocean Rider* returned to the MFF base at Blackwattle Bay, the master was interviewed by MFF management. The master provided a detailed description of the incident. The master's written incident report was provided to the Australian Maritime Safety Authority, Roads and Maritime Services and OTSI. The master and mate were later interviewed by OTSI.
- 2.2 The master stated that he was controlling *Ocean Rider* from the centre wheelhouse position. Steering was performed by the use of B-Joystick situated on the right hand side of the helmsman chair. The engine throttles and gear selection were on the dashboard in front of the helmsman's chair position (see *Figure 7*). The master stated that the rudders went abruptly to starboard without any control input from him.
- 2.3 The master described several unsuccessful attempts to regain control once the vessel was clear of the Collaroy. With the vessel stopped and safe, the master alternated between the primary AC and the secondary DC systems. After several unsuccessful attempts to regain steering control, the steering on secondary DC system responded to the A-Joystick commands.
- 2.4 The master switched back to AC and the rudders immediately turned to starboard without his input again. The master once again switched to DC and regained control of the steering. The master then slowly navigated *Ocean Rider* to Circular Quay utilising the A-joystick and the secondary DC system.
- 2.5 The mate described that while the master was focused on regaining steering control, he realised both engines were stalled by looking at the engine monitoring gauges. The mate then restarted both engines by utilising the start switches on the right side of the dash (see *Figure 9*).

2.6 The actions of *Ocean Rider's* crew contributed to avoiding a collision.



Source: OTSI

Figure 9: Engine start / Stop switches

Examination of the ferry

- 2.7 OTSI examined *Ocean Rider* at a berth at Blackwattle Bay on 6 and 7 May 2016. The MFF chief executive officer and the operations manager also attended.
- 2.8 The MFF operations manager provided OTSI with a detailed description of the incident, obtained from *Ocean Rider's* master directly after the ferry was returned to the Blackwattle Bay berth.
- 2.9 MFF demonstrated to OTSI the procedures for changing between the primary and the secondary steering systems.
- 2.10 The ferry's steering systems were operated and their functions tested with the engine running while the ferry was secured to the wharf. OTSI observed the steering pumps, hydraulic lines and mechanical connections in the tiller flat¹⁰ during the test. The steering system performed as designed during the test.

¹⁰ A space in aft part of the ship where the gear equipment for operating the ship's rudder is located.

- 2.11 OTSI sought to obtain the recorded on-board CCTV data, however, the CCTV system was inoperable and had not been recording when the incident occurred.
- 2.12 MFF advised OTSI that on 6 May 2016 after the incident an electrical contractor inspected the electrical system. The electrician believed the cause of the loss of control was a malfunction of the B-Joystick although no evidence was found to confirm this. The electrician replaced both the A-Joystick and the B-Joystick as a precaution.
- 2.13 The electrician then tested the electrical systems and no fault was identified with the steering. Further testing of the electrical system resulted in the main generator failing a resistance test and the electrician recommended repair or replacement of the generator.

Hydraulic system contamination and corrosion

- 2.14 Inspection and testing of the hydraulic system was conducted on 6 May 2016 and no faults were identified. On 11 May 2016 the hydraulic system was dismantled by a contractor for a further inspection to identify the cause of the control failure.
- 2.15 The contractor replaced the solenoids and directional control valve for both AC and DC systems. The removed directional control valve was then stripped and inspected, revealing a corroded return spring (see *Figure 10*). The contractor reported that the valve in this state would not have performed at an optimal level.

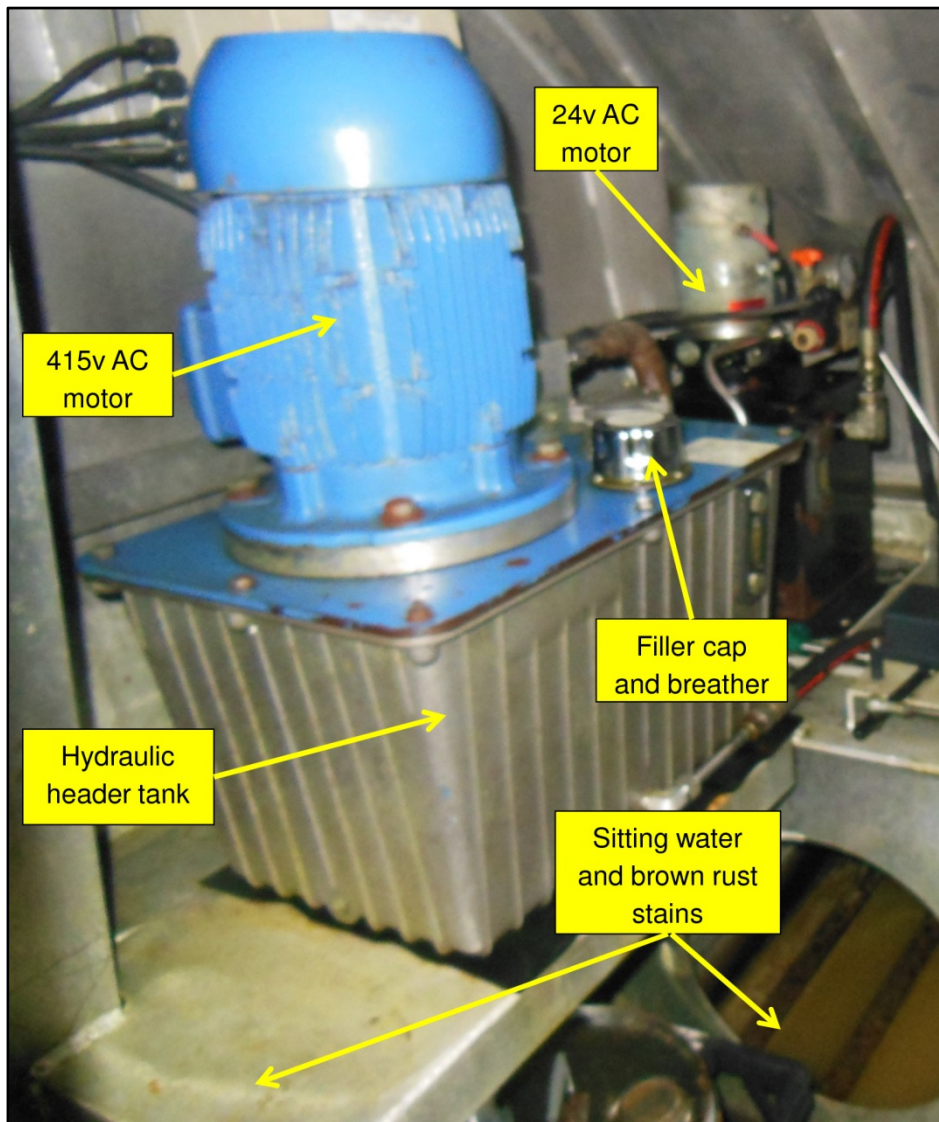


Source: OTSI

Figure 10: Corroded return spring and spool valve

- 2.16 The contractor stated that contaminants from the rusty spring could temporarily block a valve, interfering with the operation of the hydraulic ram. A blocked valve would continue to circulate the hydraulic oil within the system, until the blockage was displaced.
- 2.17 Corrosion of the return spring, which was immersed in hydraulic oil, was likely attributed to water ingress into the hydraulic oil. Water could be present either through condensation accumulating in the hydraulic system, or from an external source allowing water into the hydraulic lines.
- 2.18 Evidence provided by MFF revealed that liquid waste had on occasion entered the compartment during sullage tank pump out. MFF said, that on discovering the spill the crew would spray water from a hose to clean the compartment. Water was then pumped ashore when the compartment was clean.
- 2.19 The use of a hose to clean the compartment created a damp environment in the tiller flat. The cleaning and resultant damp environment offers a possible explanation for water ingress into the hydraulic oil and the subsequent corrosion of the spring.

2.20 There was evidence of contaminant marks and corrosion on metal components on surfaces within the tiller flat (see *Figure 11*).



Source: OTSI

Figure 11: Corroded steering components

Electrical issues

2.21 Electrical systems on vessels are required to function in a harsh environment. Vibration, heat and weather can increase the likelihood of electrical faults occurring. In order for an electrical system to function safely and effectively, it must be installed according to strict requirements contained in the National Standards for Commercial Vessels (NSCV).

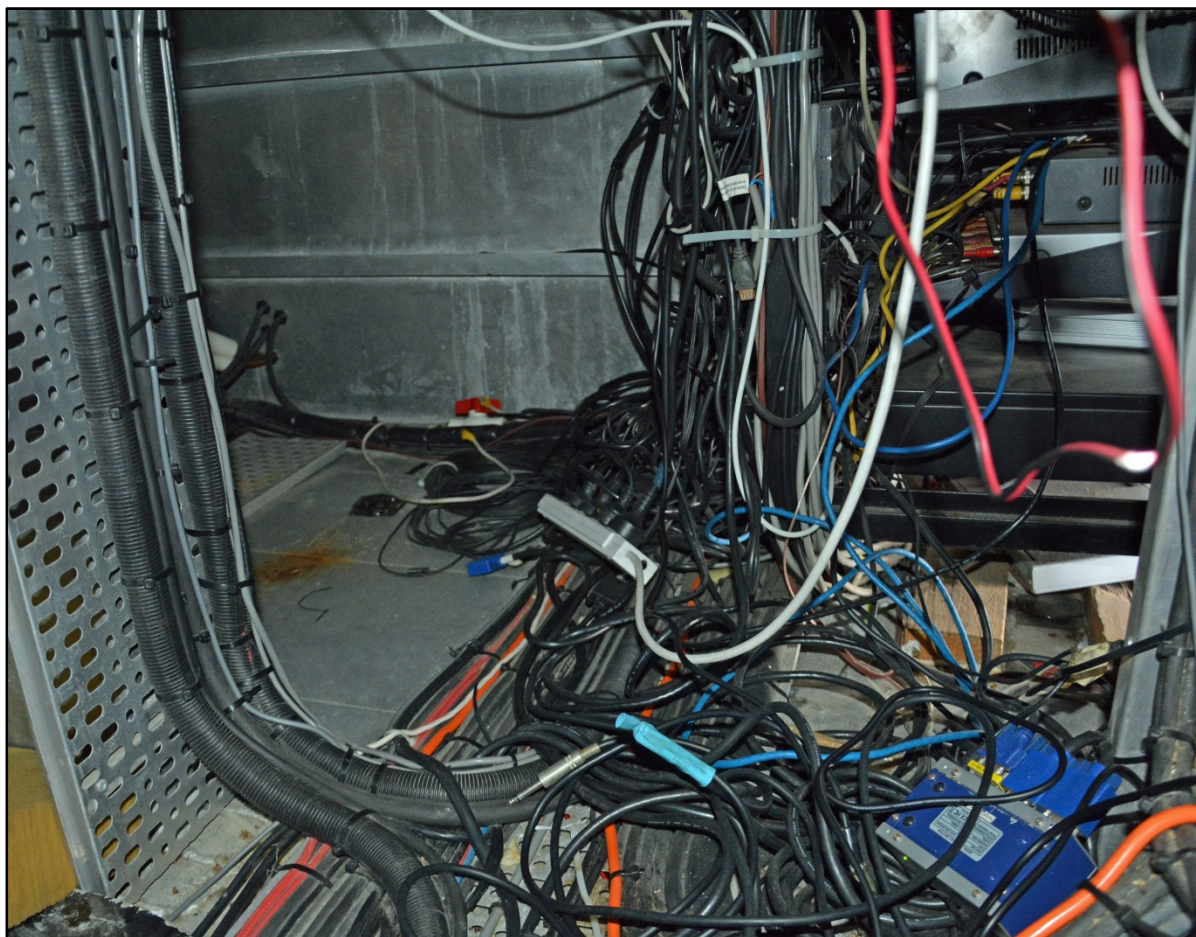
- 2.22 The NSCV utilises the Australian wiring standards when providing guidelines for electrical installations. A failure to adhere to these requirements and / or poor maintenance can significantly increase the likelihood of electrical faults occurring.
- 2.23 The electrical system associated with the steering was visually examined and a number of issues were noted. Each of these issues increased the likelihood of a fault being introduced in the electrical system.
- 2.24 The B-Joystick steering controller electrical wiring passed through the helmsman's aluminium chair base without any insulating grommet. The lack of a grommet exposed the wire to an increased risk of mechanical damage from vibration or movement against the sharp metal edge (see *Figure 12*).



Source: RMS (annotated by OTSI)

Figure 12: B-Joystick wire passing through chair base without insulating grommet

- 2.25 The vessel's electrical wiring under the dashboard was found intermixed with power supply cables, audio visual cables and unsecured stored items (see *Figures 13 and 14*).



Source: OTSI

Figure 13: Unsecured wires under dash board

- 2.26 The code of practice for electrical wiring¹¹ states that electrical leads should be arranged so they will not be damaged. So far as is reasonably practicable, avoid running leads across the floor or ground, through doorways and over sharp edges, and use lead stands or insulated cable hangers to keep leads off the ground.

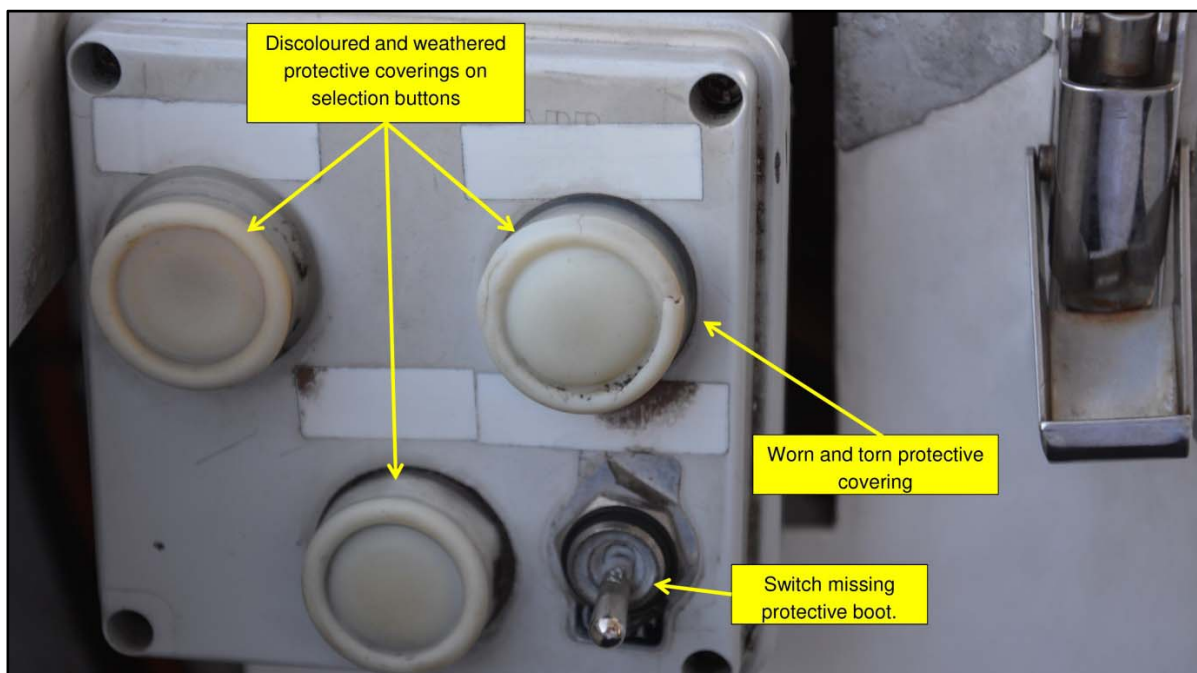
¹¹ Safe Work Australia *Code of Practice Managing Electrical Risks in the Workplace*, February 2016.



Source: OTSI

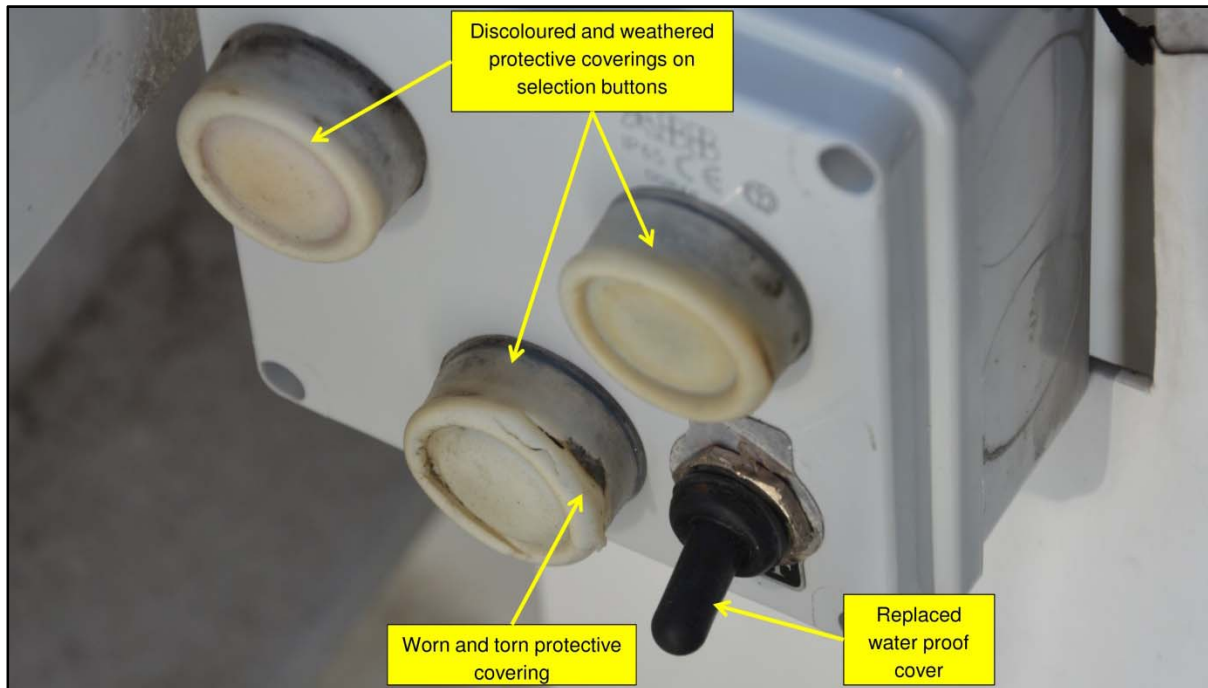
Figure 14: Unsecured items under dash

2.27 The steering controls, situated at both external wing positions and exposed to the elements, were heavily weathered. The labelling identifying the controls was faded and illegible. The protective rubber waterproof covering over the selection buttons was torn or missing, exposing the buttons to the ingress of water (see *Figures 15 + 16*).



Source: OTSI

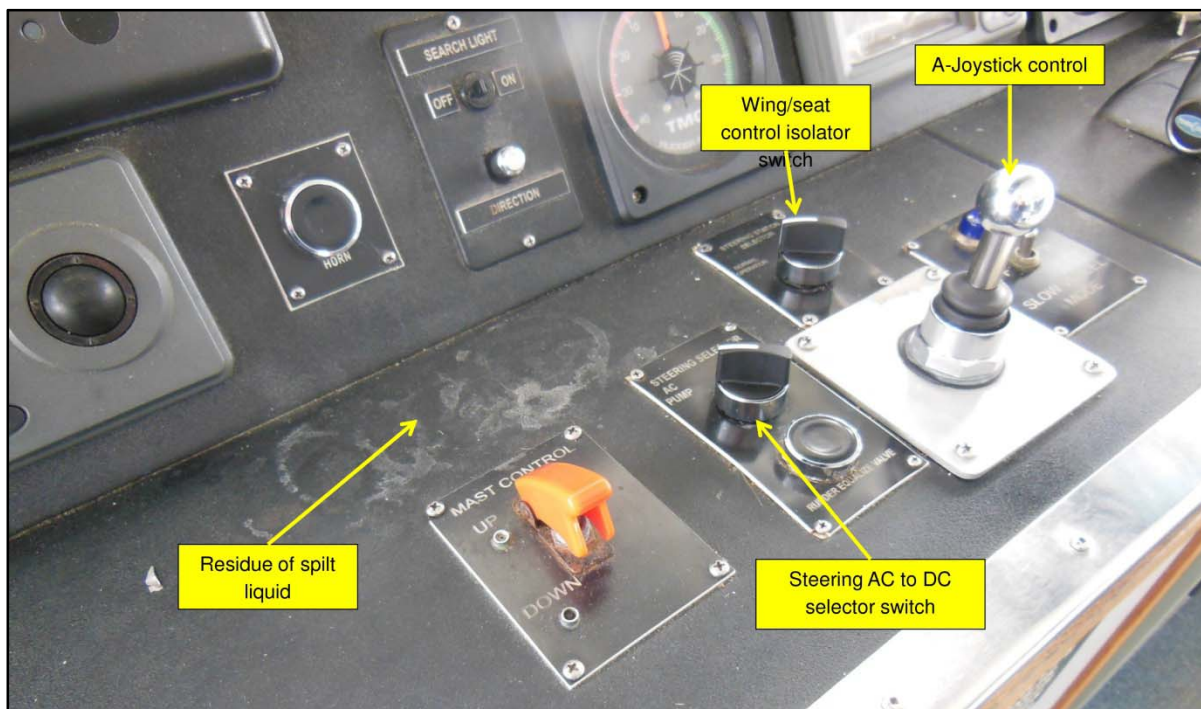
Figure 15: Port wing controls 6 May 2016



Source: OTSI

Figure 16: Port control on 8 June 2016

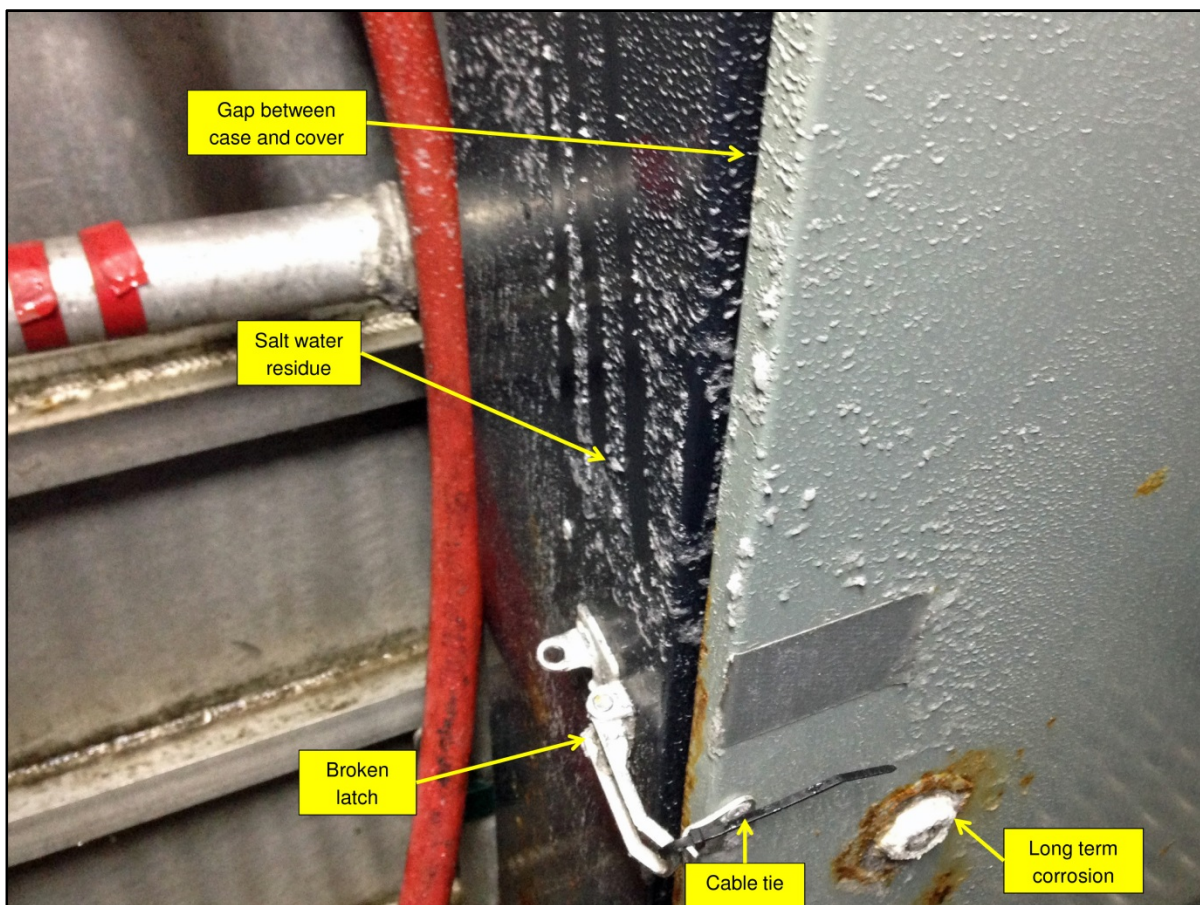
2.28 In the wheel house there was evidence of a spilt liquid on the dashboard in close proximity to the ferry's main steering controls (see *Figure 17*). The stains on the dash revealed that liquid had spilt from containers placed in close proximity to the steering controls.



Source: OTSI

Figure 17: Liquid residue near main steering controls

- 2.29 The spilling of liquid so close to electrical controls increased the likelihood of liquid draining through holes in the dash and on to the switch internals. Investigation of the dash underside revealed liquid stain or water mark on the under surface.
- 2.30 Inspection of the port side engine room revealed that the main 24v DC distribution board had a heavy covering of crusted salt residue. This residue was a result of sea water in the bilge spraying off the rotating propeller shaft. Ocean Rider's wheel house controls systems are supplied power from this distribution panel.
- 2.31 The distribution board is housed in a protective case, the cover of which was ajar due to the failure of the retaining latch through corrosion. A loose cable tie was being utilised to restrain the cover, however, the cover was adrift from the case which exposed the internal electrics to the salt water spray (see *Figure 18*).



Source: OTSI

Figure 18: Salt encrusted DC distribution board

Related occurrences

2.32 Ocean Rider had a history of steering faults and engine stalling incidents. An examination of the vessel log book revealed the following incidents occurred in the 12 months leading up to this incident.

- 28 May 2015, starboard engine stalled when engaged astern on approach to a wharf
- 20 July 2015, port engine stalled when engaged astern on approach to a wharf
- 7 August 2015, rudders uncontrollably turned to starboard while exiting Circular Quay
- 27 September 2015, dash toggle (A-Joystick) not turning to port each time
- 1 October 2015, wheel house toggle removed and tested seems to miss going to port 1/25 times MFF maintenance deems serviceable
- 27 October 2015, port engine stalled when engaged astern approaching Manly wharf
- 29 October 2015, port engine stalled
- 11 November 2015, starboard gear box control failure approaching wharf
- 16 December 15, starboard engine reported stalling three separate occasions while approaching wharves
- 23 December 2015, starboard engine stalled
- 27 December 2015, starboard gearbox not engaging
- 3 January 2016, AC steering failure
- 25 January 2016, starboard engine stalled approaching Manly wharf
- 2 February 2016, repeated starboard engine stalling
- 25 February 2016, entering western channel vessel pulled to starboard at full speed. Master isolated steering and deemed vessel serviceable.

2.33 Several other masters spoken to by OTSI reported experience with steering faults. Masters claimed that not all were recorded in vessel log book.

- 2.34 Records provided by MFF, showed a joystick being replaced on 15 October 2015.

Remedial actions taken

- 2.35 In the days following the loss of control, MFF replaced all the electrical relays and switches in the steering system including the wing positions. The hydraulic system lines were purged, cleaned and refilled and operating solenoids replaced. The ferry's electrical generation system was modified to improve reliability.
- 2.36 There were no steering malfunctions reported following the remedial work conducted in June 2016 until the time the vessel was taken out of service for major overhaul.
- 2.37 The engine manufacturers attended and made adjustments to the engines to prevent stalling occurring.
- 2.38 In December 2017 *Ocean Rider* was removed from service for a major overhaul to be carried out. The company replaced the vessel's main engines and gear boxes with the same units utilised on other vessels in the fleet.
- 2.39 The starboard generator was refurbished and an additional permanent generator installed in the port engine room.
- 2.40 The company replaced the EC300 controllers with new units and replaced associated wiring to the engines. The 24v DC distribution board has been replaced and relocated away from the port engine room.
- 2.41 The company replaced the wing steering controls with new heavy duty weather proof steering joysticks. MFF also renewed the electrical controllers and related cabling components of the hydraulic steering system.
- 2.42 The vessel modifications endeavoured to align *Ocean Rider's* configuration to other vessels in the fleet.

PART 3 FINDINGS

- 3.1 From the evidence available, the following findings are made with respect to the loss of steering control on the vessel *Ocean Rider*. The loss of control resulted in the *Ocean Rider* coming into a close quarters situation with the vessel *Collaroy* that occurred on Sydney Harbour, NSW on 5 May 2016.

Contributory factors

- 3.2 The loss of control resulted from an intermittent fault in the *Ocean Rider*'s steering control system. It is likely that this fault was electrical.

Other safety factors

- 3.3 The vessel generator had been intermittently malfunctioning for an extended period. When tested by the electrical contractor it did not pass a resistance test.
- 3.4 The steering gear located in the tiller flat previously suffered exposure to water.
- 3.5 The hydraulic system was contaminated by particles from a corroded spring.
- 3.6 The condition and routing of vessel wiring exposed it to an increased likelihood of mechanical damage.
- 3.7 The 24 v DC distribution board for the wheelhouse, located in the port engine room, was covered in salt from sea water. The water proof covering on the board was ajar which increased the likelihood of salt water entering the distribution board.
- 3.8 No fault alarms or indications were observed by crew during the incident.

PART 4 RECOMMENDATIONS

- 4.1 It is recommended that the following safety actions be undertaken by the specified responsible entity.

Manly Fast Ferry

- 4.2 Ensure that there is an effective, documented and implemented maintenance programme. This programme should include periodic inspection and replacement of control toggles.
- 4.3 Develop post incident analysis to ensure that findings from incident investigations are implemented.

Submissions

The Chief Investigator forwarded a copy of the Draft Report to the Directly Involved Parties (DIPs) to provide them with the opportunity to contribute to the compilation of the Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and to submit recommendations for amendments to the Draft Report that they believed would enhance the accuracy, logic, integrity and resilience of the Investigation Report. The following DIPs were invited to make submissions on the Draft Report:

- Transport for NSW
- Harbour City Ferries
- Manly Fast Ferry
- Australian Maritime Safety Authority
- Harbour Master