

**MARINE OCCURRENCE REPORT**

**GROUNDING**

**OF THE FERRY "MAYNE QUEEN"**  
**OFF PIERS ISLAND, BRITISH COLUMBIA**  
**12 AUGUST 1996**

**REPORT NUMBER M96W0175**

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

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### **Summary**

After departing from Swartz Bay terminal, the British Columbia Ferry Corporation (BCFC) vessel "MAYNE QUEEN" experienced a steering failure, veered sharply to port off the mid-channel, and grounded. Three of the ferry's four propulsion units sustained extensive damage. A small leak of hydraulic oil was immediately contained by booms. No one was injured in this occurrence, and the ferry was refloated on the same day during a rising tide.

Ce rapport est également disponible en français.

**Other Factual Information**

**Particulars of the Vessel**

Name	"MAYNE QUEEN"
Port of Registry	Victoria, B.C.
Flag	Canadian
Official Number	323848
Type	Double-ended RoRo ferry
Gross Tons	1,476
Crew	9
Length	84.96 m
Built	1965, Victoria, B.C.
Propulsion	Four diesel engines, 890 BHP each
Owners	British Columbia Ferry Corporation, Victoria, B.C.

The "MAYNE QUEEN" is a double-ended, RoRo coastal ferry designed to carry 75 vehicles on the main deck and 400 passengers on the upper decks. Originally fitted with two fixed propellers and one rudder at each end, she was modified in the 1970s. Since that time, the propulsion and steerage of the vessel is effected by four right-angle drives (RADs), one at each quarter of the hull. The RADs can be controlled either directly from the wheel-house or from the engine control room; when in regular service, the wheel-house control mode is used. The rudders have been welded in the amidships position and act as skegs.

Steering of the vessel is effected by rotating the RADs and pointing the propellers in the desired direction. Each RAD is rotatable through 360° by means of a hydraulic motor which turns the vertical leg through pinion gears. The wheel-house control system of the hydraulic motor is powered by 24-volt DC voltage supplied by a set of batteries, which are continuously charged via a battery charger.

Each week on Monday, the batteries are tested. During testing, the charger is disconnected and the current dials are observed while the system is in full operational mode, that is, under way and steering.

The batteries are located on the vessel's main deck in a padlocked compartment which can be unlocked with a key marked No. 3. Several copies of this key exist, one placed in the engine control room and others carried by some of the crew members.

All main switches to the charger are located in the engine control room. However, there are two switches in the battery compartment which shut off the DC power circuit between the batteries and the wheel-house. These switches, prominently

located on the uninterruptible power supply (UPS) boxes, are used to shut off DC power when the vessel is lying idle at night.

Every night from 2200 until 0500, during the night shift (graveyard shift), the vessel is tied up at one of the terminals. All machinery is stopped, and the crew performs routine maintenance. Also, the 24-volt power supply is disconnected from the wheel-house by means of the two switches.

On 12 August 1996, after an overnight tie-up, the "MAYNE QUEEN" departed from Swartz Bay terminal at 0546<sup>1</sup>. All initial checks and inspections had been satisfactorily completed before departure.

The ferry made scheduled calls to three terminals on nearby islands and completed the first round trip at 0904. At 0915, the vessel, loaded with 40 vehicles and 84 passengers, again departed from Swartz Bay terminal bound for Fulford Harbour.

At 0920, after "Full Away" was rung, the master gave the chief engineer permission to start the battery test, as had been agreed prior to departure. The third engineer, present in the control room, overheard the conversation. He then left the engine-room to collect mail from the cafeteria attendant.

At 0921, the chief engineer switched off the charger on the control room switchboard, and this was signalled by two red lights on the alarm panel marked "Charger Failure". He intended to observe the current readouts for some time and was standing by, ready to reconnect the charger if necessary. Similar signals came on in the wheel-house and were acknowledged by the master.

At 0922, two other red lights came on, with the indication "Steering Control Supply Failed". At about the same time, the master telephoned and advised that the vessel had lost steering and he made a request to restore it. The chief engineer reconnected the battery charger; however, the second pair of red lights stayed on. He then ran up the stairs to the battery compartment. On his way up, he met the third engineer who informed him that he had restored the steering. However, the vessel was already aground.

After departure from Swartz Bay terminal, the master conned the vessel through Gosse Passage. When the ferry was abeam of Clive Island, the master logged "Full Away" and gave his permission to test the batteries supplying power to the steering control. At that time, the "MAYNE QUEEN" was making a speed of approximately 10 knots and steering 030° True. Subsequently, in accordance with

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All times are PDT (Coordinated Universal Time (UTC) minus seven hours) unless otherwise stated.

routine, the anticipated alarm "Charger Failure" came on and was silenced by the master. At 0923, the helmsman reported that the vessel, which at that moment was turning to port to align with the charted course of 016° True, had lost steering.

The third engineer later reported that, upon hearing the chief engineer talking over the phone about the battery test, he had gone up the stairs, unlocked the battery compartment, and put the two switches in the OFF position. He had assumed that this was the chief engineer's intention and, although he had not been asked or ordered to do so, he had wanted to render his assistance. After switching off the power, he locked the compartment and continued to the cafeteria, which was one deck above. While he was on the upper deck, he observed the vessel swinging rapidly. He went back down to the battery compartment and put the switches back in the ON position.

Upon hearing the helmsman's report, the master called the engine-room and ordered the chief engineer to restore the steering. He also declutched all four RADs and directed one of the deck-hands to drop the forward anchor. Approximately 20 seconds later, when the steering was still not functional and the vessel kept swinging to port, the master ordered the stern anchor dropped. The order was promptly executed by another deck-hand. These measures, however, did not prevent the vessel from grounding. Still swinging to port, the "MAYNE QUEEN" ran aground at approximately 0925 in position 48°42'19"N, 123°24'20"W, on a heading of 240° True.

Immediately after the grounding, the master notified Vancouver Marine Communications and Traffic Services (MCTS) and the Swartz Bay terminal. He then ordered the sounding of the tanks and bilges. The passengers were kept informed. Before the grounding, the mate announced on the public address (PA) system that the vessel would have a hard landing. After the grounding, the passengers were advised that the vessel was not in danger. They were looked after by the catering personnel and provided with complimentary snacks.

The engine-room personnel examined the hull and the propulsion units for damage. Following these immediate actions, the sounding of the sea bottom around the hull was conducted. A short time later, some hydraulic oil was seen leaking from one of the RADs. A portable boom was immediately deployed by the crew to avert the possibility of pollution.

The vessel was refloated at 1321, during the afternoon high tide, and, with the help of a tug, returned to Swartz Bay terminal where she was secured at 1424.

During post-occurrence diving operations, it was ascertained that

the legs of RADs Nos. 1 and 2 had been sheared off. The propeller of RAD No. 3 was slightly damaged and was causing the whole unit to vibrate.

The small leak of hydraulic oil was contained and no damage to the environment was observed.

The only source of 24-volt DC power supply to the steering control is the abovementioned charger-and-batteries arrangement. The RADs can be turned individually using an alternative system (jog steering), powered by a separate 24-volt battery. Four spring-loaded switches, one for each RAD, are located on the wheel-house control panel for this purpose. The jog steering, designed and used for RAD maintenance, provides no information feedback from the RADs if the main power source is switched off. Thus, the position indicators would not show the direction of the RADs.

The master of the "MAYNE QUEEN" did not make use of the jog steering, as he was aware that without knowing the direction of the RADs, he could make the situation worse. He decided to reduce the vessel's speed by declutching the propulsion and dropping the anchors.

The weather was clear, with good visibility, light wind and rippled sea surface. The master did not report that the weather or the current were factors contributing to the accident.

The tide, however, was a significant factor when the vessel finally became free and floating. The Canadian Tide and Current Tables, Volume 5, show the following times and heights for Swartz Bay, the nearest reference point, on 12 August 1996:

Low Water	1036	0.8 m
High Water	1830	3.0 m

The grounding occurred approximately 11 minutes before low water, and the vessel was refloated during the rising tide.

The master of the "MAYNE QUEEN" held a ON-I Certificate of Competency issued by the examination branch of the Canadian Coast Guard in 1991. He had accumulated approximately 20 years of sea service on various vessels, of which approximately 5 years, since 1991, were with the BCFC as master on various ferries.

The mate, and the chief and third engineers all held proper grade marine certificates issued in Canada.

The chief engineer had accumulated approximately 25 years of sea service, mostly on deep-sea cargo vessels and has worked on BCFC vessels since 1992 as a relieving second and chief engineer.

The third engineer holds a Class 4 Motor Certificate of Competency issued in 1993 in Canada. He had accumulated approximately 5 years of sea time on BCFC vessels as an oiler, junior engineer and third engineer. At the time of the occurrence, he was on his fourth morning shift. Before starting on the morning shift, he had worked on six graveyard shifts, followed by three days off. He was not assigned to the "MAYNE QUEEN" as regular crew. His familiarization and first sailing on this vessel was in May 1996, after which he had sailed on other ferries. At various times between May 1996 and the day of the occurrence, he had been on board the "MAYNE QUEEN" on three Monday morning shifts; however, he participated in the battery test for the first time on 12 August. He had sailed with this chief engineer on another vessel, but the 12 August shift was their first sailing together on the "MAYNE QUEEN".

The "MAYNE QUEEN" was issued a SIC 17 by Transport Canada (TC) Marine Safety in Vancouver on 10 May 1995, due to expire on 09 May 1997.

### **Analysis**

The grounding occurred after the two switches in the battery room were mistakenly put in the OFF position. Some consideration therefore must be given to the location of the vital switches, their marking and the crew familiarization.

Every electrical circuit must be equipped with switches and breakers designed to interrupt the power supply. However, such switches, especially those guarding vital circuits, must be clearly marked and protected against accidental use. The two important switches on the "MAYNE QUEEN" were located in a compartment that was padlocked to prevent passengers from entering it. However, the fact that there was an unknown number of keys to this padlock in the hands of various crew members and there was no additional protection of the switches, made these switches susceptible to accidental use.

The third engineer had used the two switches to de-activate the vessel during graveyard shifts, but he was not familiar with the battery-testing procedure nor did he know how the chief engineer intended to carry out the test. This lack of familiarity may be attributed to the fact that these two individuals had never sailed together on this ship previously. Furthermore, as the tests were conducted on Mondays only, it was the first time that the third engineer had participated in one of them.

The third engineer, who knew how to disconnect the power supply, assumed that putting the switches in the OFF position would be the procedure to use to perform the battery test. It seems that

the familiarization process was not thorough, and that, in particular, no discussion had taken place between the chief and third engineers regarding the standard method of performing the battery test. This inadequacy may have been compounded by the fact that the crews are often transferred from one vessel to another.

The master had a crucial and difficult decision to make: either use the jog steering to turn the vessel away from the reef or stop her before she ran aground. Turning the RADs blindly, without knowing their actual direction, carried the risk of increasing the vessel's speed toward the shallow water when there was no room to make the attempt and observe the vessel's reaction. Declutching the RADs and dropping both anchors, thus decreasing the momentum, is considered to have been the proper and justified action in the circumstances.

### **Findings**

1. The power supply to the steering system was disconnected while the vessel was under way and turning to port, when two switches in the electrical circuit of the power supply were mistakenly turned off by the third engineer during a weekly battery test.
2. The third engineer was not familiar with the battery-testing procedure on this vessel.
3. The vessel, without any steering, kept swinging to port until she grounded on a nearby reef.
4. The master attempted to avoid grounding by stopping the propulsion and dropping the anchors. These actions appear to have been appropriate measures in the circumstances.
5. All actions following the grounding, up to and including refloating, taken by the master, the crew and the owners were timely and appropriate in the circumstances.
6. The ferry's propulsion units sustained extensive damage.
7. The passengers were looked after by personnel and kept informed.



### **Causes and Contributing Factors**

The "MAYNE QUEEN" experienced a steering failure, veered to port and entered shallow water. Although the RADs were declutched and both the bow and stern anchors were dropped, these measures did not stop the vessel running aground.

The steering failure occurred when the power supply to the main steering control system was disconnected during a routine test of the control unit batteries. The third engineer, participating in the test without the chief engineer's knowledge, was insufficiently trained in battery-testing procedures.

### **Safety Action Taken**

Following this occurrence, the owners modified both the switches and the testing procedure on the "MAYNE QUEEN" and the "BOWEN QUEEN" as follows:

- Each of the two main switches is fitted with a lock;
- red labels with warnings are placed next to the switches;
- a spare key to the battery compartment has been placed by the door in a glass box;
- the battery tests are conducted at dock side; and
- jog steering indicators were installed.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 07 August 1997.*