Mariners' Alerting and Reporting Scheme

MARS Report No 349 November 2021

This month's MARS has a slightly different format. In this issue we will delve into the Blind Pilotage Paradigm in detail. Three case studies will be examined where blind pilotage was being employed because visibility was close to zero. Some of these examples took place while under a pilot's con while others were under the con of the vessel's crew. In each case, humans were controlling the vessel movement and making decisions on helm and engine inputs in what is commonly called blind pilotage. Until unmanned vessels are to the fore, the paradigm of blind pilotage under human control will continue to present its own set of challenges and risks. These case studies give important lessons learned that every mariner would best be served to heed. Each case study highlights its own specific lessons learned. To conclude, we will stitch together some common threads from all three case studies.

MARS 202153

Allision with bridge support

As edited from NTSB (USA) report MAR 09/01

➔ In the early morning hours, a pilot had embarked on a berthed container vessel and was tuning one of the radars prior to departure. He was not satisfied with the results and told the Master that, due to the degraded visibility and the poor radar performance, the departure would probably be delayed. He continued to tune the radar with the assistance of the vessel's Master and OOW. He inquired via VHF radio to both harbour traffic control and other vessels as to the visibility further out in the harbour. From all reports it was very low at about 0.25 nm.

The pilot's plan to exit the harbour was to use parallel indexing to pass under the bridge and between two of the bridge supports. This was the main shipping channel and the supports were about 670 metres apart, a large gap that was not technically difficult to navigate and marked at mid-section with a radar beacon (RACON). However, the pilot did not inform the bridge team of his parallel index specifications. Neither did he request that his outbound courses, and specifically the course through the bridge supports, be put on the vessel's electronic chart. The crew had indicated an outbound course on the paper chart, but the pilot did not appear to have validated this. Neither the Master nor the OOW inquired about the pilot's navigation plan.

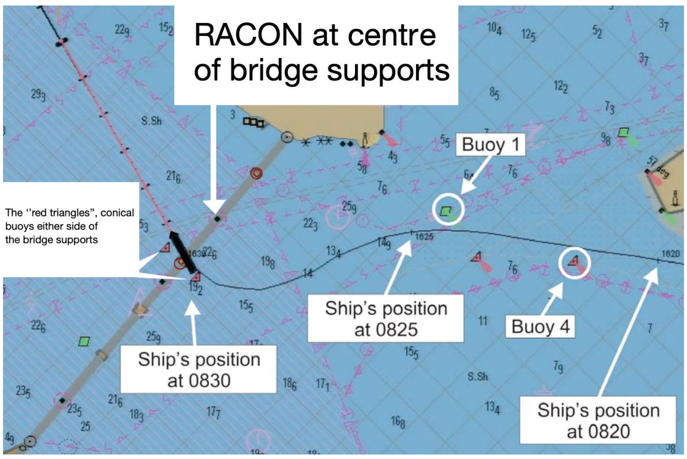
At the point of departure, with visibility still very poor, the Master commented 'The fog is so heavy'. The pilot seemed satisfied with the radar, and his response to the Master's comment was: 'Single up if you want...'. The Master agreed and departure was started. A tug was used to assist the stern away from the berth and then assigned to follow with slack line from the stern fairlead. By 08:06 the vessel was underway. At one point, the vessel's speed was increased from slow to half ahead at the pilot's request, giving a speed near 10 knots against a flood tidal current of about one knot.

A turn to port was initiated using 10 degrees of port rudder. The vessel soon reached the Variable Range Marker (VRM) ring set at the distance for the parallel index course through the bridge supports. But the pilot seemed to think the radar image of the bridge was distorted, so he turned to the electronic chart. Looking at the screen, he asked the Master what the red triangles on the electronic chart represented. The Master responded 'This is on the bridge'. In fact, the red triangles were simply a representation of the two red conical buoys either side of the bridge support, a fact with which the pilot should have been familiar. Meanwhile, the helm was still 10 degrees to port and the helmsman reminded the pilot of this fact. The pilot acknowledged the reminder and, some 40 seconds later, asked for midships.

Shortly afterwards, the pilot ordered 10 degrees starboard rudder, then 20, and asked for full ahead. According to the Voyage Data Recorder (VDR) capture of the ship's radar display at this moment, the ship's heading was 241° (almost parallel with the bridge) and its course over ground was 255°. About this time, when the vessel was 0.3 nm from the bridge, a port VTS operator was concerned that the vessel was out of position to make an approach under the bridge. He called the pilot, addressing him by his pilot designator name, 'Romeo' instead of the vessel's name, as was the practice in this port. When the VTS call came the pilot asked the helmsman to ease to 10° starboard. Once the conversation with VTS was finished, some 25 seconds later, the pilot requested starboard 20° helm once again. Pointing to a place on the electronic chart, the pilot asked the bridge crew 'This is the centre of the bridge, right?' The Master responded yes, and soon afterward the pilot requested hard starboard.

Over the next two minutes, the pilot gave rudder orders of hard starboard, mid-ships, starboard 20°, and hard starboard. At 08:29, the crew posted at the bow reported the bridge column close to port. About 10 seconds later, the pilot ordered the rudder midships and then hard port rudder. An allision was now inevitable and the pilot wanted to reduce the swing of the stern towards the bridge support.

The forward port side of the vessel struck the corner of the fendering system at the base of the bridge support at 08:30. The bridge support was unaffected due to the fendering and cement pier skirt but the vessel suffered a large gash. Fuel tanks were punctured, causing pollution. The vessel was subsequently brought to anchorage to allow time to assess the situation.



Lessons learned

- A shared plan where everyone on the bridge is working from the same basis means there is a chance of catching and correcting an error, if it happens.

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- In this case, the Master had some reservations about the departure, as his comment to the pilot testifies ('the fog is so heavy'). But he did not question the pilot's impetus to leave. If you are in charge, take charge.

■ **Editor's note:** The official investigation found, among others, that the pilot suffered degraded cognitive performance due to the number of medications he was taking. This would have probably affected his ability to interpret data, thus degrading his ability to safely pilot the ship under the prevailing conditions. While this may be possible, it is also possible that complacency and thick fog combined into a formidable trap. A loss of spatial orientation, such as that experienced by aviators who neglect their instruments, is certainly a possibility even without degraded cognitive performance. The next two case studies are good examples of this. But, irrespective of the immediate cause, single point failure was a major contributor to this accident. Had the pilot's plan been shared with the bridge team, especially the parallel index specifications – and had the pilot's departure courses been applied to the electronic chart – the chances of the vessel hitting the bridge support would have been much smaller. Hence lesson learned number one above. Better yet, had the departure been postponed until better visibility the accident would surely have been avoided. Lesson learned number two.

MARS 202154

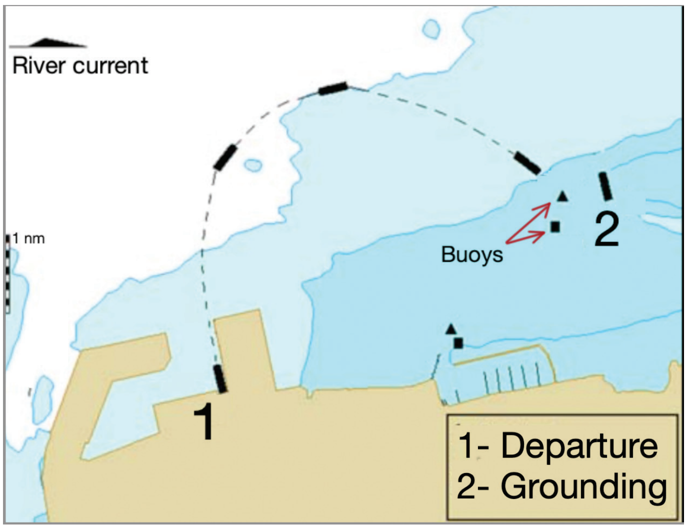
Ferry trip ends with U-turn into shore

As edited from TSB (Canada) report M04L0050

➔ In the early morning hours, a double-ended passenger/vehicle ferry was loaded and departed on its short run across a river. Visibility was reduced by fog to less than 30 metres but the Master, at the controls, was experienced in this run and the departure was kept to the schedule. Another officer was also on the bridge. Both radars were in use and both were set for relative motion display, which is an unstabilised, head-up presentation. This was the standard radar setup for this bridge team on this run as almost all navigation was done visually. No electronic chart system had been fitted on the ferry.

Once the vessel cleared the departure basin and passed the jetties, it quickly fell off to starboard into the river current setting approximately 075° at two knots (see below), but this was not visually apparent to the bridge team. However, the Master and mate both noticed that the gyrocompass repeater heading was rapidly turning to the east.

As the Master and mate monitored the radars, both set on the 1.5 nautical mile scale, they saw the echoes of the nearby landmass quickly shifting, creating a blurred image. This was to be expected since the radars were set on unstabilised, head-up presentation. Nonetheless, the bridge team were now flustered and unable to quickly determine the vessel's position. Without visual cues or an understanding of the blurred radar image, the Master and mate looked to the GPS receiver to gain an appreciation of the vessel's speed. Soon, the lookout reported seeing buoys ahead. The Master manoeuvred to avoid the buoys and, shortly thereafter, some 10 minutes after departure, the vessel grounded.



Later that morning, with the assistance of a tug, the ferry was refloated. No apparent damage was found and the ferry resumed service later that day.

The official report notes that '... the bridge team was essentially trained and experienced in visual navigation, but undertook a blind pilotage voyage.'

Lessons learned

- Blind pilotage not only requires proper training, but practice too. Practise your blind pilotage technique whenever possibly, especially in good weather.
- A north-up, stabilised radar setup is superior to an unstabilised setting when navigating in low visibility conditions.

MARS 202155

Narrow harbour entry proves too tricky in low visibility

As edited from official MAIB (UK) report 8/2021

➔ A ferry was en route for its destination port. The passage plan had recently been used on three previous voyages and took the ferry from berth to berth. After departure the Master discussed the following morning's entry into the arrival port with the officer possessing the destination port pilotage exemption certificate (PEC). They agreed that the PEC holder would handle the vessel's approach and berthing, with the Master in a supporting role. Both officers then had a ten-hour rest period.

Wind and sea conditions were calm. Visibility was two to four nm with some patches of fog visible towards the coast. The PEC holder arrived on the bridge and began preparing to take the con for harbour entry. He set up the ferry's radars, inserting a parallel index (PI) line on both displays for the entry course. The ferry's planned route had been previously entered into the Electronic Chart System (ECS), although the chart displayed the vessel as a simplified symbol instead of a 'to scale' ship shape.

When the Master arrived on the bridge the PEC holder used images on his mobile phone from webcams situated in the harbour to show that the turning basin had clear visibility. Content that conditions were suitable for entry, the Master did not change the plan. With the vessel now making 13 knots, the PEC holder called VTS on VHF radio to request permission to enter the harbour. Permission was granted. About this time the PEC holder engaged hand steering and used the tiller arm to steer. He also reduced the vessel's speed to 10 knots.

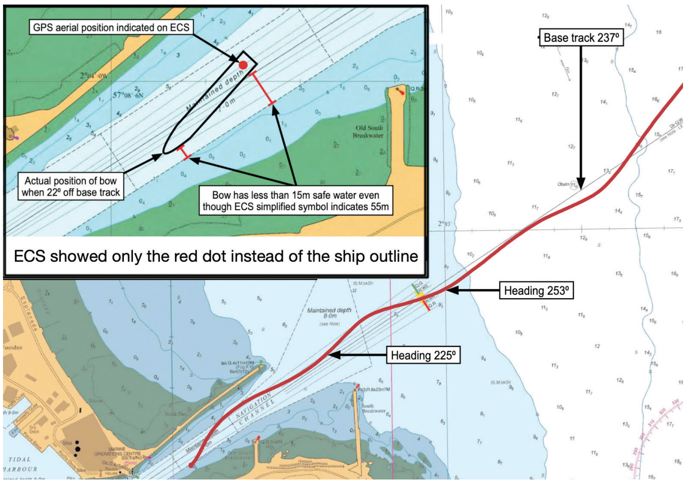
Initially, the PEC holder kept a relatively steady course, with the ferry slightly to the south of the navigation channel centreline. Realising that visibility was decreasing, the vessel's third officer (3/O) completed the navigation in restricted visibility checklist. Although all the items on the checklist were marked as being complete, no helmsman was brought to the bridge and sound signals were not sounded as required. The vessel's 3/O continued to plot fixes on the paper chart, and the bosun, stationed on the forecastle, acted as a forward lookout.

Soon, coastal fog began to further reduce visibility to about 150 metres. The Master and PEC holder reduced the range scales on their radars to 0.75 nm, and later to 0.5 nm and then 0.25 nm as the vessel passed the breakwaters. The Master asked the PEC holder if he was sure he wanted to continue, and the PEC holder said that he was.

As the vessel approached the harbour entrance, the PEC holder steered a heading of 250° (COG of 253°), tracking to the north of the planned course of 237° along the centre of the harbour's navigation channel. Prompted by the Master, who was using the S-Band radar and looking at the Electronic Chart System (ECS) display, the PEC holder altered heading to 225°. Soon, the vessel came within 10 metres of the planned track as it passed the fog-obscured south breakwater, and the PEC holder altered the ferry's heading to 234°. During this time, the 3/O plotted positions on the paper chart.

The vessel was now fully in the navigation channel, and the PEC holder reduced speed to dead slow, which gave 6.5kts over the ground. The PEC holder altered the vessel's heading to 245°, and the ferry again moved north of the centreline and to the very edge of navigable water to the north. The Master and PEC holder then saw the north breakwater and realised they were heading into danger.

The PEC holder applied about 10° of port rudder to bring the ship back towards the planned track. In response to prompting from the Master, the PEC holder applied more port helm until there was 30°. The vessel rapidly crossed the narrow channel, and after 15 seconds, the PEC holder realised the new danger and applied maximum starboard rudder, but this alteration was too late. The ferry grounded at 6.5kts, raking along its port bow and port side before coming to a stop on the southern edge of the 70 metre wide channel.



Hull, propellor and rudder damage on the port side required repairs that kept the ferry out of service for four weeks. The official investigation found, among other things, that the grounding was due to the bridge team losing situational awareness in thick fog.

Another finding was that the use of one parallel index (PI), as in this case, was insufficient for safe navigation in near zero visibility. Multiple PIs to display safety limits, effectively drawing a corridor down which the ship can be safely driven, would be more appropriate for such conditions. Additionally, by having only a symbol representing the ship on the ECS instead of a scale outline of the vessel, important safety information such as the swept breadth within the channel was not available to the bridge team.

Lessons learned

- Commercial pressure or even personal overconfidence can contribute to our making wrong decisions. When it comes to conning a ship in restricted waters and visibility, taking a conservative approach is probably the best option.

Case study recap

The three case studies have some remarkable differences but also some striking similarities. In two of the three cases, an electronic chart was available but not used effectively or could not display the vessel in an appropriate manner. Blind pilotage requires not only a detailed plan but information inputs on the state and position of the vessel in real-time. And the detailed plan must be a shared plan, such that all of the bridge team have the same mental model of the passage plan and manoeuvre. What these case studies demonstrate is how quickly and definitively a person's spatial orientation and situational awareness can be compromised in near zero visibility if the proper information is not available or is not consulted. Finally, blind pilotage takes practice – best do this when the weather is good to hone your skills.

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