

GPS jamming and spoofing – good practice example

Safety Flash Published on 20 August 2026 Generated on 20 August 2026 IMCA SF 15/26

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What happened?

A Member's vessel in the Red Sea encountered GPS jamming. Due to the GPS signal anomaly, the vessel's position on the ECDIS suddenly appeared to shift to a location near the coast, dozens of miles away from the actual position, and the GPS-based speed over the ground (SOG) also changed abnormally from approximately 12 knots to 39 knots.

The incident occurred while the Master was at the helm. The Master assessed the situation rapidly, immediately recognized the position jump phenomenon, and smoothly switched to manual navigation. All the deck officers, including the Master, had previously conducted training in "dead reckoning" (DR) navigation, as GPS jamming and spoofing incidents had been reported in the area.

GPS-derived speed over the ground (SOG) became unreliable. As the vessel was navigating in waters over 200m in depth, echo sounder bottom tracking could not be used to obtain reliable speed over the ground information either. Therefore, speed through the water (STW) was used as the primary speed reference for DR navigation. The bridge team continuously monitored the vessel's position using DR plotting, radar information, visual observations, parallel indexing, and all other available means to ensure safe navigation until the vessel cleared the affected area.

This incident highlights the importance of maintaining a high level of awareness regarding GPS jamming and spoofing. It also emphasizes the need for bridge crew to be familiar with GPS interference response procedures and to be capable of conducting safe DR navigation using alternative means, in the absence of reliable GPS information.

The vessel safely transited the affected area without relying on GPS signals. No injury, damage, pollution, or navigational incident occurred as a result of the event.

What was the cause?

GPS signal reliability was compromised due to ongoing GNSS (GPS) jamming activity reported in the area. No direct malfunction of the vessel's equipment was detected, and the incident is believed to have been caused by external radio interference.

Lessons to learn

This case study is a representative example of the growing threat of GPS jamming and spoofing recently observed in various parts of the world including the Red Sea, the Persian Gulf, the Eastern Mediterranean, the Black Sea and the Baltic Sea.

In particular, the following points should be noted:

- Do not rely solely on GPS position data;
- Be suspicious and alert: perform a cross-check immediately when a position jump occurs;
- Continuously compare the radar position and ECDIS position;
- Passage Planning: when navigating high-risk waters, be sure to include the following:
 - GPS Jamming Risk Assessment
 - Alternative Position Fix Method
 - DR Navigation Procedure
 - Contingency Action Plan
- Navigation Equipment - items to check when GPS signal is lost
 - Radar Position Fix / Parallel Index / Gyro Error Monitoring / Echo Sounder
 - Speed Log / Visual Navigation – LOOK OUT OF THE WINDOW!

Actions

Members should establish, or review, their own procedures for loss of GPS positioning.

- Remain informed on the risks of GPS jamming and spoofing
 - Share information on GPS jamming incidents in area of operations
 - Conduct a pre-voyage briefing for the bridge team and identify relevant risks during the passage plan phase
- Develop Dead Reckoning (DR) navigation capabilities
 - Conduct appropriate DR navigation training prior to entry into the area.
 - Conduct practical training and maybe even drills for GPS loss scenarios.
- Use all available means of navigation
 - DR Plotting
 - Radar Observations
 - Parallel Indexing
 - Visual Bearing
- Update GPS Firmware: some older GPS firmware versions have limitations in the ability to save and maintain positions after manual position input. Check with the supplier or manufacturer.

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