The use of ECDIS Alarms

Loss Prevention Bulletin

Although many vessels have been fitted with Electronic Chart Display and Information Systems (ECDIS) on a voluntary basis, the use of such equipment will increase significantly once passenger vessels, tankers and dry cargo ships begin to comply with mandatory SOLAS requirements for ECDIS which are due to be phased in as from 1 July 2012.

ECDIS equipped vessels have been involved in a number of groundings which may have been avoided had it not been for failures in the setup and use of ECDIS alarm systems. IMO performance standards require the equipment to include a function whereby the user can select a safety contour from the depth contours available on the Electronic Navigation Chart (ENC). ECDIS should permanently display this contour, emphasised by a thicker line and a prominent change in colour for the depths on either side. If no safety contour is selected, the depth should default to 30m in keeping with International Hydrographic Office (IHO) recommendations. The performance standards also require ECDIS to sound an audible alarm, which may be combined with a visual alarm, before a safety contour is crossed. The time interval between the alarm sounding and crossing the contour is set by the user.

Although all ECDIS units that have been type approved in accordance with IMO requirements incorporate this important alarm function, its use may be overlooked as the following incidents show[1].

Grounding of a 19,000 GT Bulk Carrier

A 19,000 GT self-discharging bulk carrier was on a loaded passage through confined waters when the vessel grounded and sustained a 3 metre fracture in a ballast tank. The bridge watchkeeping officer had made a number of alterations of course to avoid a sailing vessel and another small craft. These collision avoidance manoeuvres forced the vessel away from the planned track and into shallow water where the vessel grounded at 12 knots.

The vessel had a maximum draft of 10.6m and may also have been affected by squat. It was subsequently found that the safety contour had been set to 10m which, even allowing for the rise of tide above chart datum, was clearly inadequate.

The alarm was triggered before the safety contour was crossed, but the only warning was a visual alert on the ECDIS screen. This was not noticed by the watch-keeping officer as he was engaged in collision avoidance and was not monitoring the vessel's position on the ENC. Although an audible alarm should have sounded in addition to the visual alert, the audible alarm feed had been disconnected.

The Master and deck officers had completed a generic ECDIS training course based on IMO Model course 1.27. However, the official investigation report concluded that their knowledge on the use and functionality of the ECDIS safety features was insufficient as they had not undergone any type-specific training. In particular, they failed to recognise that the safety contour setting was inappropriate for the voyage and were unaware that an audible warning should have sounded when the safety contour alarm was activated.

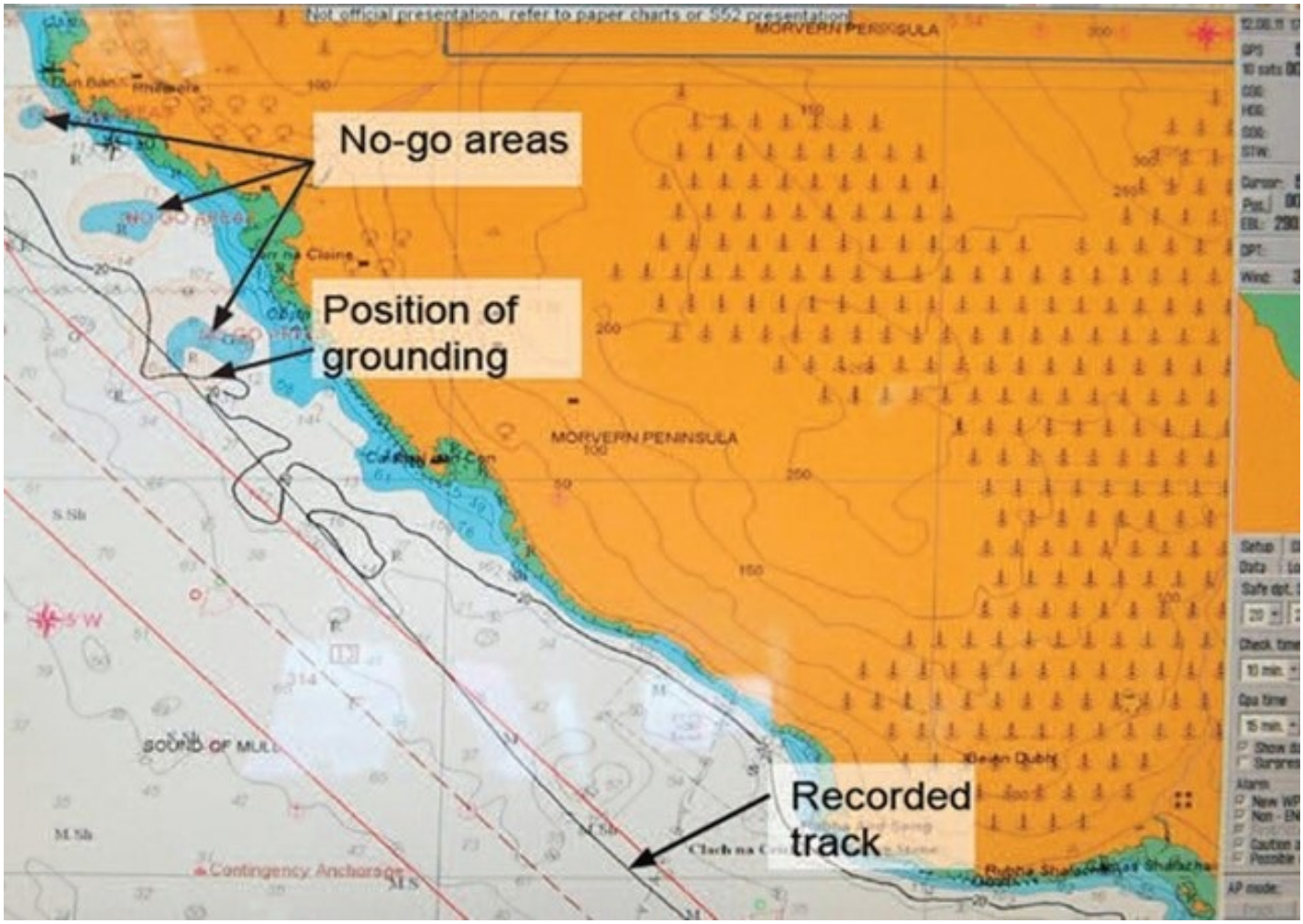

Photo: MAIB Report: Grounding of CSL Thames in the Sound of Mull. © Crown Copyright. Planned and actual track of 19,000 GT bulk carrier

Grounding of a 90,000 GT Container Vessel

A 90,000 GT container vessel grounded on a sandbank while steaming westbound at 21 knots in a Traffic Separation Scheme (TSS).

Although the vessel was fitted with ECDIS, the equipment was not approved for use as a means of navigation. Only paper charts were permitted. Nevertheless, prior to the incident the bridge watchkeeping officer was reportedly using the ECDIS for navigational purposes. Due to the way that the ECDIS had been set up, he was unaware that the vessel was heading towards shallow water.

The investigation team found that the safety contour had been set at 30m. With the screen adjusted for night viewing, the colours inside the 30m safety contour meant that almost the entire westbound lane of the TSS around the sandbank was displayed in various shades of dark blue. The colouring made it difficult to distinguish the shallow areas from deeper water or to see the buoys marking the sandbank. The investigation team found that the shallow areas could be identified more easily when the safety contour was set to 20m. They also suspect that the safety alarms (including the safety contour alarm) were either switched off or did not function as the system was using raster charts at the time of the grounding which, unlike ENCs, do not possess the vector data necessary to activate them.

Although the bridge officer was found to be an experienced watchkeeper, he had not received any formal ECDIS training.

Grounding of a 4,000 GT General Cargo Ship

A 4,000 GT general cargo ship adjusted its ETA to arrive at the pilot station earlier than planned in order to meet a high tide. The vessel subsequently grounded on a sandbank.

The passage plan was amended when the ECDIS was displaying the ENC at a scale of 1:100,000. Visual inspection of the route on the ECDIS showed it to be clear at this scale. The fact that the vessel would pass a starboard hand lateral buoy on the port side whilst following the direction of buoyage was not investigated further. Had this been checked, it would have been evident that the amended passage plan took the vessel over a sandbank with charted depths considerably less than the vessel's draft. However, this was not obvious to the deck officer who amended the passage plan, or to the bridge officer on watch at the time of the grounding.

The safety contour function on the vessel's ECDIS was fitted with a watch vector function whereby a time and angle for the predicted movement of the vessel needed to be set in order to trigger the safety contour alarm. Although the safety contour had been set at 30m, the alarm did not function as the watch vector had not been activated by the bridge team.

It was found that the Master and deck officers had received no formal ECDIS training. They failed to recognise the signifi- cance of the safety contour and did not know how to set a watch vector ahead of the vessel. They were also unaware of the need to check the ECDIS for violations of user defined limiting parameters (such as the safety contour) when adjusting the passage plan.

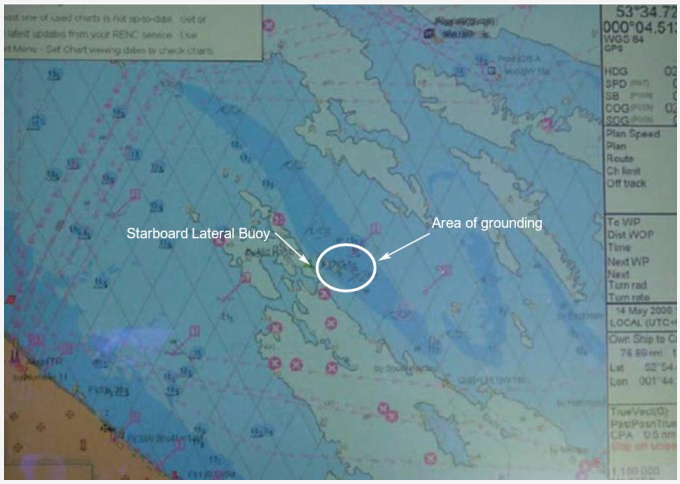

Chart view on 4,000 GT general cargo ship at a scale of 1:100,000 as used for amending the passage plan; note the lack of detail in the area of the grounding. Photo: MAIB Report: Grounding of CFL Performer Haisborough Sand North Sea. © Crown Copyright

ECDIS Training and Familiarisation

It is estimated that there are up to 7,000 ECDIS units in use worldwide. This number is due to increase considerably from 1 July 2012 onwards once the mandatory introduction of ECDIS begins to be phased in under SOLAS.

Training in the use of ECDIS is now addressed in the revised Seafarers' Training, Certification and Watchkeeping (STCW) Code 2010 which entered into force on 1 January 2012. It is up to each flag state to decide on the precise requirements, but it is believed that in many cases IMO model course 1.27 is being used as the basis for generic ECDIS training, coupled with specific training on the type of equipment installed on board. However, due to the way in which some flag states have interpreted the transitional ECDIS training requirements, it may be some time before all bridge watchkeeping officers have undergone such training, even if appointed to vessels using ECDIS as their primary means of navigation.

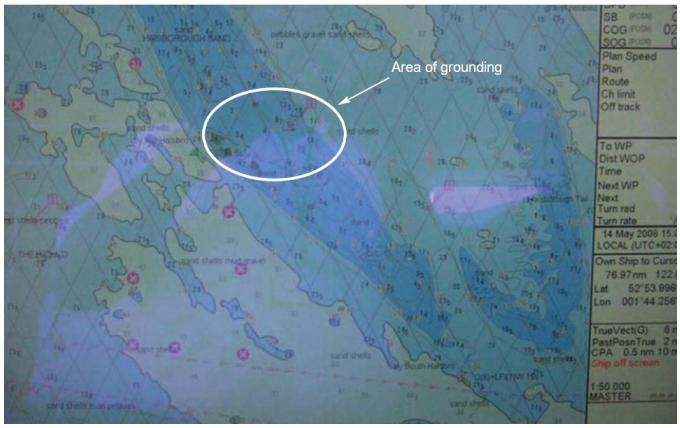

Chart view on 4,000 GT general cargo ship at a scale of 1:50,000; note the much greater detail in the area of the grounding. Photo: MAIB Report: Grounding of CFL Performer Haisborough Sand North Sea. © Crown Copyright

Irrespective of the above, if a vessel is fitted with ECDIS, Members should be mindful of the familiarisation training requirements set out in Parag 6.3 of the ISM Code which state (in part):

The Company should establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the environment are given proper familiarisation with their duties.

Also their obligations under Parag 6.5 of the ISM Code:

The Company should establish and maintain procedures for identifying any training which may be required in support of the safety management system and ensure that such training is provide for all personnel concerned.

Recommendations

As these three case studies show, Masters and deck officers may be unfamiliar with the set-up and use of ECDIS alarms which operate in accordance with IMO performance standards, increasing the risk of a grounding. Masters and deck officers should be familiar with:

- The types of alarms available on their ECDIS
- The types of warning (visual, audible or a combination of both) associated with each alarm
- The procedure to switch on and set alarm parameters

It is further recommended that:

- Alarm parameters are adjusted throughout the voyage to ensure that they are optimised for the prevailing circumstances and conditions
- Changes to alarm parameters are considered when preparing the passage plan for the next voyage
- Checks are made to ensure that user defined limiting parameters, such as the safety contour, are not violated when it has become necessary to adjust the passage plan after departure

Members requiring further guidance on this topic are advised to contact the Loss Prevention department.

[1] The case studies outlined in this bulletin reflect the observations and findings contained in various reports published by the UK Marine Accident Investigation Branch (MAIB).