

MISCELLANEOUS ACCIDENTS OF RECREATIONAL CRAFTS USING AUTOMATIC STEERING SYSTEMS (Autopilot)

In the past, several accidents in which the use of an autopilot played a role were reported to the BSU. In some cases, this resulted in high property damage as well as injuries to persons.

What happened?

- (1) The skipper of a motor yacht (LOA¹ 11 m) proceeding upstream in the port of Hamburg switched on the autopilot while picking up an object that had previously fallen from the steering console. The autopilot could not be switched off again immediately afterwards. As the yacht steered back to the right side of the fairway after a previous evasive manoeuvre, a quay wall was ahead. An allision could no longer be prevented and considerable material damage was caused to the yacht. Two persons were injured.
- (2) A sailing yacht (LOA 22 m) collided with a research/survey vessel (LOA 73 m) on the Kiel Canal after the skipper had presumably switched on the autopilot and gone below deck. The sailing yacht remained on a straight course at the edge of the fairway despite a curve being ahead in the canal and collided with the aft starboard side of the research vessel sailing in the middle of the canal. There was property damage to both vessels.
- (3) While underway through the Kiel Canal, the boat hook attached to the backstay of a sailing yacht (LOA 10 m) came loose. In order to be able to reattach it himself during the voyage, the skipper switched on the autopilot. When passing an inland waterway vessel (LOA 85 m) moored at a jetty at a distance of about 6 – 7 m, the autopilot suddenly executed a 90° course change and a collision occurred, causing minor material damage to both vessels.
- (4) A sailing yacht (LOA 16 m) was proceeding on the Kiel Canal using the autopilot when the skipper decided to leave the cockpit to secure lines on the forecastle that were flapping in the wind. The autopilot suddenly changed course to starboard and the yacht collided with a dolphin. Material damage was caused to the sailing yacht.
- (5) A sailing yacht (LOA 21 m) was running before the wind in the Baltic Sea when the helmsman decided to switch on the autopilot to clean a cockpit window. Immediately after the activation of the autopilot and when the helmsman was already away from the helm, there was a course change that led to an accidental gybe. On the way back to the helm, the helmsman was caught by the mainsheet, thrown to the side and suffered fatal injuries.

¹ LOA = Length over all.

Why did it happen?

- Use of the autopilot in narrow waters (near other vessels or structures (dolphins, quays, etc.)), (1) (2) (3) (4)
- lack of delegation of tasks to other persons on board by the helmsmen – the helmsmen handed over the helm to the autopilot and performed the tasks themselves, (1) (3) (4) (5)
- inadequate securing of items on board - to rectify this, (the helm was left and) the autopilot was engaged, (1) (3) (4)
- leaving the helm while using the autopilot and loss of situational awareness due to lack of lookout / lack of position fixing, (2)
- technical defect ("freezing") of the autopilot, (1)
- deflection of the autopilot's sensors due to external influences, (3) (4)
- being in the danger zone of the mainsheet while the yacht is bearing away as well as using the autopilot in following winds without using a gybe preventer. (5)

What can we learn?

- Recreational crafts wishing to pass the Kiel Canal manned by only one person should plan for the possibility of short-term stops when planning their voyage, as recreational crafts are not allowed to use their autopilot on the Kiel Canal;
- Even when using an autopilot, a proper lookout must always be maintained in order to retain situational awareness;
- The more restricted the navigable waters and the smaller the space for unintentional course deviations or autopilot errors, the faster someone must be available to switch to manual control and take over;
- It must be technically possible to quickly switch to manual control at any time (even in the event of a system failure of the autopilot) and the procedures for doing so must be known to helmspeople;
- Users of autopilots must be aware of the technical limitations of the system installed, the characteristics of the sensors connected/used and the significance of the settings made on the autopilot (operating mode, steering behaviour, etc.);
- Large masses of steel/iron (other ships), live cables (submarine cables, overhead power lines over rivers and canals) and other external influences can significantly distract magnetic and fluxgate compasses and thus, in conjunction with an autopilot, cause unintended, violent course changes;
- The steering behaviour of the autopilot must be monitored for several minutes (also to ensure that the system is working at all) before considering temporarily abandoning the helm in open sea conditions;
- On vessels under sail, autopilots cannot guarantee that a course deviation will be avoided - even a wind transducer control can reach its limits under certain conditions, e.g. if the sails are set inappropriately;

- On sailing yachts, autopilots are to be used only with extreme caution when sailing in following winds and/or seas, ideally only with the additional safeguard of a gybe preventer.

Irrespective of the accidents listed here, the following advice must also always be taken into account before/when using an autopilot on board recreational crafts:

- If the speed is too low and/or when in heavy seas, it should be considered that the automatic course control may not be able to maintain the course with the required accuracy due to its working principle, which means that manual steering operation should be selected;²
- A prerequisite for reliable steering results is appropriate dimensioning (including performance in relation to vessel size and rudder pressure) as well as successful calibration of the autopilot, regular software updates are recommended;³
- When sailing, the autopilot should only be engaged when the sails have been optimally trimmed and the rudder pressure is as low as possible in order to avoid increased energy consumption and too slow a reaction to external influences (e.g. wind gusts);⁴
- When using waypoint control, it must be known and taken into account depending on the situation whether the system initiates the course change automatically when a course change point is reached or only after confirmation (pressing a button);
- In situations that are particularly demanding on helmspeople and require quick, concentrated and professional action, steering should not be left to an autopilot.

Who may benefit?

Skippers, water sports enthusiasts, operators and owners of recreational crafts, sailing schools

² BERKING; HUTH: *Handbuch Nautik – Navigatorische Schiffsführung*. Hamburg: DVV Media Group GmbH, 2010. – ISBN 978-3-87743-821-3. P. 227.

³ BERND GRÖNEVELD on BLAUWASSER.DE: *Elektrischer Autopilot: Dimensionierung, Kalibrierung, Steuerverhalten, Wartung und Service*. <https://www.blauwasser.de/autopilot> (17/08/2023).

⁴ ibidem.