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GUIDANCE FOR THE OPERATIONAL USE OF INTEGRATED BRIDGE SYSTEMS (IBS)

1 The Maritime Safety Committee, at its seventy-sixth session (2 to 13 December 2002), adopted the annexed Guidance for the operational use of Integrated Bridge Systems (IBS), which has been developed to support the safe operational use of an IBS by promoting procedures necessary to ensure adequate knowledge of system functions for Mode Awareness, Situational Awareness and Workload Management in addition to traditional seamanship.

2 The aim of the Guidance is to define the basis for minimum criteria on the operation, training and quality control for Integrated Bridge Systems. This Guidance is applicable to the operation of ships fitted with Integrated Bridge Systems (IBS), which include Integrated Navigation Systems INS (B) or (C), as per resolution MSC.86(70).

3 Member Governments are invited to bring this Guidance to the attention of all parties concerned.

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ANNEX

GUIDANCE FOR THE OPERATIONAL USE OF INTEGRATED BRIDGE SYSTEMS

Introduction

This guidance supports the safe operational use of an IBS by promoting procedures necessary to ensure adequate knowledge of system functions for Mode Awareness, Situational Awareness and Workload Management in addition to traditional seamanship.

The aim is to define the basis for minimum criteria on the operation, training and quality control for Integrated Bridge Systems.

1 Scope

This guidance is relevant to the operation of ships fitted with Integrated Bridge Systems (IBS), as per resolution MSC.64(67), annex 1, which include Integrated Navigation Systems INS (B) or (C), as per resolution MSC.86(70).

2 Definitions

For the purpose of this guidance, the following definitions apply.

2.1 Mode awareness

Mode awareness is based on the knowledge and purpose of various operation modes included in the IBS. Use of different operation modes should follow bridge procedures based on company automation policy.

2.2 Situational awareness

Situational awareness is the mariner's perception of the navigational and technical information provided at the INS workstation, the comprehension of their meaning and the projection of their status in the near future, as required for timely reaction to the situation that can be expected from his/her trained skills in the operation of the INS.

2.3 Failure analysis

The failure analysis aims to demonstrate that the system has a fail-to-safe functionality. The failure effects and their consequences are assessed for the installed components.

3 Bridge procedures

The bridge procedures, provided for the ship, should implement the functions, capabilities and limitations of the installed IBS. Especially the documentation should include clear instructions about conditions under which automatic control functions may be used or not.

Note: Automatic steering may only be useful where precise manoeuvring is required, if the automatic control system supports the required precision, e.g. by considering speed through water for rudder control.

The Company should have personnel ashore capable of supervising, training and evaluating the company Operational Procedures and operational use of the Integrated Bridge System.

3.1 Vessel Operating Manual (VOM)

The Vessel Operating Manual (VOM) should incorporate the Company policy for implementing and using automation and the Integrated Bridge System.

The operational manual consolidates and abbreviates the manufacturer's operational manuals to a comprehensive operational manual without detailed technical information.

The VOM should clarify the integration and the priority of sub-systems within the control system. Special emphasis should be laid on the effect of sub-systems on the total outcome of navigation control. Advantages and disadvantages between control and automation modes should be explained in a clear form. It should be clearly indicated for which situations, the different modes are designed.

The VOM should indicate corrective actions to be taken when the system gives alarm.

Operating limitations and their reasons should be thoroughly explained.

A description of the checklists and purpose of the specific items should be included in the VOM.

Terminology for standard Call-Outs should be developed by the Company and presented in the VOM.

Note: Where the VOM includes other items connected to the IBS, such as cargo handling or other vessel sub-systems the resulting functions, capabilities and limitations should be addressed.

3.2 Normal procedures

Standard Operating Procedures for normal situations should cover normal operation at different stages of the passage including the vessel's operational limits, manoeuvring trial data and ship's data including squat and anchoring.

The route should be divided into zones according to the nature of navigation, as follows:

- Sea passage;
- Shallow waters, pilotage waters and fairways; and
- Harbour areas.

The standard operating procedures should be documented in the form of checklists demonstrating transition from one zone to another. The items to be listed are e.g. manning of the

bridge and the use of automated equipment including the selection of subsystems and their modes of operations.

Manual or automatic heading, track and speed control modes and the required actions for changing modes should be clearly presented in the graphical or checklist flow chart form, if not clearly indicated by the equipment itself.

3.3 Emergency and abnormal procedures

Emergency and abnormal procedures are essential for optimum Workload Management.

The emergency procedures refer to SOLAS Conference 29.11.1995 'Decision support system for masters on passenger ships (SOLAS/Conf.3/46, Annex, page 14, regulation 24.4). Operation of Integrated Navigation, Control and Communication systems should be considered in the following procedures:

- Blackout;
- Fire;
- Stranding;
- Collision;
- Man-over-board situations;
- Unlawful acts threatening the safety of the ship and the security of its passengers and crew;
- Emergency assistance to other ships;
  (the list is not complete)

All emergency procedures should be presented in a logical structure, e.g. by listing each emergency control mode in the form of a checklist, and by providing appropriate overviews.

The abnormal procedures should focus on alarms and items not generally needed in normal operation. Typical situations are sub-system failures that require decisions regarding the level of automation to be used.

Both emergency and abnormal procedures should carefully consider the failure analysis of the system.

A list of alarms of different subsystems should be harmonized to cover the whole Integrated Bridge System (IBS). Special emphasis should be laid on operational procedures in case of an alarm to switch the system on a lower automation level, manual mode or to switch sensor.

Note: All checklists based on Standard Operational Procedures should be provided in an easy-to-handle, concise and durable form.

3.4 Passage plans

The Passage Plan should be programmed in the Integrated Navigation System. The normal procedures related to the route should be programmed in the waypoint data. The procedures should contain at least the following information:

- Speed and track limits;
- Control mode (e.g. heading, course, track and speed);
- Compulsory radio communication; and
- Reference to the checklists.

The route should be programmed with a safe practice taking into account routeing systems, fairway lines, channel marks, shallow waters and oncoming traffic.

The track limits should be sufficiently large to avoid operationally unnecessary alarms.

Passage planning should conform to resolution A.893(21) - Guidelines for voyage planning.

3.5 Records

The bridge procedures should include clear instructions on marking, starting, ending and storing of records and passage plans provided by the IBS.

Recording should conform to resolution A.916(22) - Guidelines for the recording of events related to navigation.

4 Implementing new technology

A modified IBS should only be put into normal operation after successful functional testing.

During all new equipment or new version tests, the procedure to switch to manual or emergency control should be obvious. The minimum requirement to conduct the procedure is one command per device. The procedure should be documented. A new system should not be operated before new manuals have been delivered and studied.

The test should start in a safe area with the technically simplest mode. The technical level can be increased when the crew is familiar with the mode and when the crew has ensured that the desired operational safety is achieved.

The officers should be aware of which area and which mode testing is allowed. Regular meetings should be held to plan and decide fixed time periods for the proceedings of the technical tests and operational training within the Company limits documented in the Vessel Operating Manual (VOM).

5 Training programme

The company, in co-operation with the relevant manufacturers, should establish a training programme for all officers which have operational duties involving the IBS.

5.1 Knowledge-based training

In designing theoretical training packages, the following items should be amongst those to be considered:

- Manoeuvring characteristics of the ship;
- Operational limitations;
- Propulsion and control systems, both manual and automatic modes of operation and emergency controls;
- Communication systems;
- Integrated Navigation System; and
- Navigation and communications procedures for normal, abnormal and emergency situations.

5.2 Skill-based training

In designing theoretical skill-based training packages, the following items should be amongst those to be considered:

- Handling the ship in normal, abnormal and emergency situations;
- Using all available levels of automation relevant to the operational situation;
- Failure mode control; and
- Adherences to the Company's Standard Operating Procedures (SOP).

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