Technical Report Documentation Page

1. Report No.	2. Government Accession Number	3. Recipient's Catalog No.
CG-D-03-01		

4. Title and Subtitle	5. Report Date
Automatic Identification System (AIS) User Requirements	December 2000
	6. Performing Organization Code Project No. 2410.5
7. Author(s) Michael Edwards and David Pietraszewski	8. Performing Organization Report No. R&DC 436
9. Performing Organization Name and Address U.S. Coast Guard Research and Development Center 1082 Shennecossett Road Groton, CT 06340-6096	10. Work Unit No. (TRAIS) 11. Contract or Grant No.
12. Sponsoring Organization Name and Address U.S. Department of Transportation United States Coast Guard Marine Safety and Environmental Protection (G-M) and Systems (G-S) Washington, DC 20593-0001	13. Type of Report & Period Covered Final 14. Sponsoring Agency Code Commandant (G-MWV), (G-SCT) U.S. Coast Guard Headquarters Washington, DC 20593-0001

15. Supplementary Notes

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16. Abstract

Automatic Identification System (AIS) is a new technology that should improve situational awareness for the mariner by providing navigation information such as the names, positions, courses, and speeds of vessels in the immediate vicinity. Over the past decade, there has been a great deal of research to support the standards for AIS set forth by the International Maritime Organization (IMO), International Telecommunications Union (ITU), International Electrotechnical Commission (IEC) and International Association of Marine Aids-to-Navigation and Lighthouse Authorities (IALA). However, there has been little work done to develop the AIS users' needs relating to this technology. Without a relevant and easy to use interface, AIS will not be an effective tool for the mariner. This report attempts to describe and qualify some of the requirements for the user interface based on AIS tests conducted in San Francisco Bay, the Baltic Sea and British Columbia. Discussed are issues involving display features such as vessel icons, Vessel Traffic Service (VTS) information, carry aboard units, and workload issues related to the new technology. Coupled with a user-friendly interface, the AIS information should allow the mariner to focus more time on the navigation situation around them thus increasing situational awareness and safety.

This report only scratches the surface. Areas that still need to be explored include enhanced AIS issues such as direct sensor information, shore radar integration, intermodal information, environmental mishaps, and search and rescue responses.

17. Key Words	18. Distribution Statement
Automatic Identification System, AIS, UAIS, San Francisco Bay	This document is available to the U.S. public through the National Technical Information Service, Springfield, VA 22161.

19. Security Class (This Report)	20. Security Class (This Page)	21. No of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	25	

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EXECUTIVE SUMMARY

The United States Coast Guard (USCG) is focused on preventing mishaps at sea. Mishaps destroy millions of dollars of property, cause environmental damage, and take many lives in our ports and waterways each year. With an increase in situational awareness, many of these maritime casualties and mishaps can be avoided. Current situational awareness, or the mariner's perception of his environment, uses a vessel's own radar and the mariner's scrutiny to safely navigate. Often these methods are enhanced with information from a Vessel Traffic Service (VTS), navigation signals such as lights or sounds, or by radiotelephone communications. During times of good visibility and low traffic density, these methods are timely and informative enough to help the mariner safely navigate. However, in areas of high traffic, low visibility, or blind spots that can affect radar, visual or radio communications, situational awareness can be significantly hampered.

Automatic Identification System (AIS) is a promising technology that will be implemented over the next decade to provide mariners with additional information to increase situational awareness. AIS will automatically broadcast, among other things, the vessel's navigation information such as name, position, course and speed. Any vessel within Very High Frequency (VHF) radio range similarly equipped with an AIS unit will detect the other units and receive their corresponding information. Much work over that last decade has been focused on the internal functionality of the AIS units themselves. However, little has been done to determine what information is useful to the mariner and how that information should be displayed on the bridge of a ship. Without an efficient and effective user interface, the AIS information and equipment may become a burden rather than provide the intended situational awareness.

This report outlines some specific user requirements for this new technology. It is intended for groups interested in developing AIS user requirements as they relate to system usage and the user's interface. It combines subjective feedback from three AIS-like tests completed in the Baltic Sea, British Columbia, and most rescently in San Francisco Bay. The issues of vessel icons, information displayed, and VTS radar data are explored. Some possible effects on the mariners' work environment are also discussed. Finally, future work in expanding areas such as enhanced AIS, and digital networks are presented.