

AIS Training Issues

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Introduction

The arrival of Automated Identification Systems (AIS) brought with it a good many questions and equal number of opportunities for improvement of both navigation and collision avoidance awareness. AIS certainly provides information that is useful to the mariner, but the challenge is to ensure that the information presented is effectively managed and integrated with the other resources on the bridge. To be an effective tool, AIS must be displayed and presented in a manner that makes its information readily useable.

Background

AIS is required to address three functional requirements: first to be a tool in collision avoidance, second to provide information about a ship and its cargo to littoral states, and third to provide data to enhance the services provided by VTS operations. As originally envisioned the listing of the functions also indicated their relative priority. Especially in United States that priority has changed a bit, with the security issue being given increased importance. The implementation of the Marine Transportation Security Act (MTSA) in 2002 made the role of the second function of AIS more littoral state security than purely an informational function. It also, in the minds of many, pushed the security function of AIS to a prominent position.

There are also four different display options for AIS available. First, AIS can be integrated into an ECDIS or ECS display and displayed on that equipment. Here one would have the AIS information provided to the operator in the form of complex iconic plots representing each AIS target and associated details of the target such as bearing, heading and speed. The AIS data, like the own ships positional and radar data, would be displayed in a real time fashion on an accurate electronic chart making the AIS information much more useful for navigation and safety purposes. A second option is that AIS can be integrated into an ARPA display and displayed on that equipment. The third option is AIS can also be displayed on an iconic or computer display. The fourth way that AIS information can be displayed is on a manual keyboard display, a simple relatively inexpensive display option. This is the most elementary AIS display concept, incorporating a three-line alphanumeric display screen, typically a backlit monochrome liquid crystal display (LCD) device. Alphanumeric text conveying the basic AIS information scrolls across the display, allowing the operator to read the information. A simple keyboard or keypad is provided to allow limited operator input and control of the display device. Because it is limited to three scrolling lines of alphanumerics, this device does not lend itself to conveying the graphical images that are so often considered to possess much greater information density. But more importantly this type of display would require manual plotting to be translated to a geographic reference and this very act of plotting negates the real time nature of the information.

Discussion

“The MKD is next to worthless as a navigation aid. AIS only truly comes into its own when it is integrated with ECDIS or some such display.” The preceding quote is a statement by a Canadian master, who has extensive experience in close-in, high traffic environments, in response to a query as to the effectiveness of AIS. His feeling was that the only way to make the AIS function effectively was to integrate the data into an ECS/ECDIS display. In the Canadian experience this makes a good deal of sense since their mariners are practiced with the use of ECS and the vast majority have received formal training on the system (note most Canadian mariners are using an ECS system although they often refer to the systems as ECDIS). He goes on to elaborate as follows: “AIS when integrated with an ECS/ECDIS system is going to or has provided a huge change in the way we operate on the Seaway. I can now see opposing traffic well ahead of us and can arrange to meet them where and when is best, and at a suitable safe speed. On the lake, particularly in poor visibility, I can make a judgment as to what actions other traffic may make and can prevent hazardous situations from developing.’

Single purpose and alphanumeric displays make the kind of information synthesis described above almost impossible. In addition they force the mariner to draw on one more stand-alone system when making decisions. The NTSB (1997) report on the Royal Majesty pointed up the problem created by stand-alone systems, which might lead to information overload. While the integration of the AIS into ECS appears to be the solution, this approach requires a clear understanding of the demands and constraints of the maritime environment, as well as, an appreciation of the capabilities of the sensors and data sources. It also places an additional burden on the individual watch stander who must also be well schooled in the capabilities and limitations of his installed systems, including ECS and AIS. Training in both these systems should be a requirement for watch officers.

Training Issues

The issues that need to be addressed when considering a training program for AIS are the same ones that IMO identified in publication T127E “Course in the Operational use of ECDIS.” The objectives of that course are for the mariner to:

- Understand the basic principles of ECDIS data and their presentation
- Operate the ECDIS equipment; and
- Be aware of all potential errors

The objectives then for the AIS portion of an ECS/ECDIS course are:

- Understand the principles of AIS data and their presentation
- Operate the AIS function of the equipment
- Be aware of potential errors

It is extremely important for AIS operators to understand the source of the various elements of the AIS data stream. By having a firm grasp of where information is coming from the mariner is much more likely to be able to discern errors early and can more easily identify what other bridge equipment might be available for validation. The operator must be familiar with iconic presentation and the interpretation of the various elements.

The proper setup of their own ships information and the proper display settings of the set are also key issues in the training program. Of particular importance is the entry of ship specific information (either compulsory or optional). Operators need to understand that these elements are important and should be part of the voyage planning process. For a navigator, a key element of information is destination. That piece of information gives the mariner an indication, at certain junctures, of what the ships action may be. For instance, a ship departing Ambrose Channel with a destination of Charleston, SC could be expected to turn right into the Ambrose to Barnegat Traffic Lane. Improperly entered data or old data could cause a good bit of confusion. A sensor origin for GPS entered at the wrong end of a 1,000-foot vessel could prove misleading in fog in a narrow channel like the Detroit River.

Fostering caution, creating awareness of potential errors, and emphasizing the need to be alert to cross checks available are key elements in the training. Typically manufacturers provide training in the features of the set and that is a necessary part of the training, but of critical importance is knowledge of where and when errors are likely to occur and what data is subject to misinterpretation. Our experience has indicated that simulator training is particularly effective in getting these points across. Training sessions in classroom and on actual equipment are reinforced by simulator exercises in full mission simulators where real life scenarios under differing environmental conditions, traffic density and data entry correctness are replicated. Successes and failures are critically debriefed and the mariner assimilates the lessons quickly and effectively.

The training regimen needs to allow time for practice and repetition. Exposure to the task once won't necessarily get it across. The goal of the training has to be the development of an acceptable level of operator proficiency. The key elements of the training then must emphasize proper equipment setup, use, and interpretation. The value of the AIS information must be related to both the ECS display and the other supporting bridge equipment. We must be able to use all our senses but more and more mariners will be required to refine their ability to scan information sources and extract data. The aircraft pilot is required to scan large amounts of data in his cockpit displays and through practice masters that technique. The marine environment presents a challenge in that data displays are not at all standard in presentation or location. Despite this difficulty, the mariner can, for a given configuration, develop effective techniques to extract needed data.

A five-day course that covers both ECS/ECDIS and AIS and is a combination of classroom, laboratory and full mission simulators is a very effective vehicle in accomplishing the objectives listed above. There is ample time for repetition and practice and the inclusion of full mission simulation in the course allows the mariner to function "at sea" with the equipments and displays found on a bridge. Given realistic and challenging scenarios the mariner is put to the test during the course and is able to identify the strong and the weak points of the system and gain an appreciation of how to best employ his bridge resources.

Summary

The training regimen then must be far more than simple “buttonology”. It needs to be something akin to Bridge Resource Management where all the resources available to the mariner can be effectively utilized and a synergy produced by using the team. In the case of AIS training, the focus must be the use of equipment in an integrated scheme that allows the mariner to effectively use the information presented. In addition, and perhaps most importantly, the mariner must gain an understanding of when the data presented might be in error or is likely to be misleading, and what corroborating data can be used to eliminate ambiguity. A course that combines classroom, laboratory and full mission simulation is most effective in meeting these objectives. The goal is a mariner thoroughly knowledgeable of and thoroughly proficient in the operation of his equipment.