
AIS: a status report

AIS requirements for small ships in the US - AIS systems for pilots - AIS displays - AIS expert Fred Pot reviews developments so far

On July 3rd, 2003 the US Coast Guard published its Interim Rule on compulsory AIS carriage in vessel traffic system (VTS) areas.

It starts with SOLAS carriage requirements and then adds many

smaller vessels, covering about 10 to 15 times more vessels than U.S. SOLAS ships.

They include commercial vessels longer than 20m, tugs long then 8m & 600 hp as well as excursion

boats and ferries over 100 GT or > 50 passengers.

'Area Maritime Security' is given as the reason for pushing AIS carriage down to such small boats, not avoiding collisions (although they are likely to be reduced as well).

Many objections to the Interim Rule are currently being raised, primarily due to the cost of AIS transponders.

It will be interesting to see the

effects, if any, of ship operators' vehement lobbying efforts to be exempted from AIS carriage requirements. The Final Rule will be published late October.

The US is not unique in requiring small boats to carry AIS. The St. Lawrence Seaway and the Panama Canal have very similar carriage requirements. Will Canada follow and harmonize its AIS carriage requirements with those enforced in the US? Will the rest of the world follow? It is too early to tell.

Class "B" transponders

Even though lower cost Class 'B' (non-SOLAS) transponders are not explicitly mentioned in the Interim Rule, USCG will consider allowing them to replace Class 'A's if the Class 'B's receive type approval in the US.

The problem is that type-approved Class 'B's will probably not be available in quantity before the AIS carriage deadline (year-end 2004) because Class 'B' standards may not be published until this time next year.

The committee that is responsible for setting international standards for Class 'B' transponders is striving mightily to hold down their cost. This is turning out to be very difficult because Class 'B's will need to interoperate with Class 'A's on the same frequencies and use the same protocols.

Class 'A's are very complex instruments. Especially their ability to not only use the two VHF Channels that were designated for AIS (AIS1 and AIS2) but also other VHF frequencies. Requiring such 'full frequency agility' in Class 'B's severely limits opportunities to make them much less expensive than Class 'A's.

What frustrates potential Class 'B'

manufacturers is that it is by now clear that VHF channels beyond AIS1 and AIS2 will not be widely used.

Even the US, which was one of the major proponents of 'frequency agility' requirements, is close to making AIS1 and AIS2 available in its waters. Making frequency agility optional for Class 'B's is the best outcome as far as manufacturers are concerned.

Avoiding collisions

The risk of collisions can be mitigated with AIS because it can provide better predictions of where nearby ships will likely be in a few minutes than radar can.

collisions especially in restricted visibility, narrows, through bridges and around capes.

AIS displays

These benefits can only be realised if the relevant information is presented to the OOW on an electronic chart display or a radar screen.

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AIS has been found to alert the Officer on the Watch (OOW) of a target's course change almost in real-time while ARPA has to derive it from comparing the position of a number of (sometimes fuzzy) echoes.

Also, if the target broadcasts its rate of turn, then AIS can predict its (curved) path more accurately than ARPA can.

Furthermore AIS will allow hailing a nearby ship via VHF by its name or callsign to clarify passing arrangements if they are in doubt.

Such passing arrangements can actually be made well ahead of time because AIS typically has a range of about 30 nm (nautical miles).

Allowing the OOW to plan ahead rather than to have to react to traffic situations will mitigate the risk of col-

ed in a least cost installation distracts the OOW because it requires him to watch yet another instrument that presents him with information out of (radar or electronic chart) context.

Presenting AIS information on a non-type approved electronic chart system (ECS) should not be very expensive. A number AIS-ready ECS systems are already available that are type-approved to act as MKD's for a number of different transponders. They run on an inexpensive Personal Computer.

Also, ECS software that replaces the MKD requires no more cable connections than an MKD. They only require a single serial cable connection to an AIS presentation port via a US\$200 off-the-shelf (RS422 -> RS232) converter.

If it is deemed important to show not only AIS but also ARPA targets on ECS then it will, additionally, need to be connected with radar.

Several radar manufacturers are offering type-approved units that can display AIS information. This is a viable option for new-builds and re-fits, but adapting older radars to display AIS information is not an option. Instead it will be much more cost effective to add ECS for this purpose.

Pilots and AIS

Pilots in South East Alaska are currently evaluating five AIS-ready ECS packages that run on their laptop and connect to the AIS Pilot Port.

Like the AIS presentation port, the AIS Pilot Port provides not only AIS target information but also own ship position, COG, SOG, Heading and Rate of Turn.

The results of their evaluations will be published on www.uais.org (See www.uais.org/PilotECSComparison.htm for details about the evaluation).

There is nothing new about pilots bringing their laptops with them on pilotage jobs. Quite a few ship operators have accommodated them by providing both a (NMEA) data port that gives them GPS information as well as a power plug near the conning station.

Some operators, however, have discouraged pilots from bringing their laptops because they feel that the pilot should be part of the bridge team, apply Bridge Resource Management (BRM) principles and use the same (very expensive and) type-approved navigation instruments that the rest of the bridge team uses.

They frown on pilots using un-approved laptops running un-

approved ECS packages that may use un-approved charts. They frown on pilots conning their ships while isolating themselves from the rest of the bridge team with their own navigation system using their own routes.

Pilots, on the other hand, don't like to be forced to use a new set of possibly un-familiar navigation instruments every time they board a ship.

They don't necessarily know how to perform the most basic functions on a ship's (integrated) bridge system such as setting display and alarm parameters and using an ERBL (Electronic Range and Bearing Line).

They know that the ECS package they bring on-board is not necessarily type-approved but they know it inside out. They have tuned it to exactly match their display and alarm preferences and they have plotted their own proven routes. Pilot's ECS packages also help them log voyage tracks for replay later to train new pilots or simply as electronic logbooks.

AIS changes this debate in favour of the pilots because IMO has recommended an AIS Pilot Port and a power plug near the conning station on SOLAS ships.

Pilots can use the AIS Pilot Port to control information that the transponder broadcasts such as destination, estimated time of arrival, draft and the number of persons on board. They can do this with all AIS-ready ECS packages.

However, from a strictly legal point

of view, AIS-ready and AIS type-approved are not the same. Transponders receive type-approval in combination with the MKD or ECS/ECDIS package that controls the transponder. Some transponder manufacturers have received several type-approvals for their transponder, each time with a different ECS/ECDIS package. But whether a pilot's ECS package has been type-approved for the type of transponder that happens to be on the ship he is currently piloting remains a game of chance.

AIS installation

Proper installation of AIS on older ships is complicated by the requirement that AIS broadcasts position, SOG and COG from the same GPS that is used for navigation.

This is impossible for ships that use pre-1995 versions of GPS for navigation. They cannot be connected to AIS because they use an old communication protocol that AIS doesn't understand.

A further complication is that SOLAS ships will in the future be required to carry a type-approved Differential GPS (dGPS) but the testing criteria for type approval of these units was only very recently published. Few type-approved dGPS's are currently available that can be used to replace pre-1995 GPS's.

The story is much the same for heading and rate of turn sensors.

Fred Pot is Principal of Marine Management Consulting, an AIS Consultancy based in Seattle. He can be reached via www.uais.org. Areas of expertise include maritime business strategy, navigation systems and services, communication systems and services, and system implementation management. Clients include cruise lines, ship operator associations, pilot associations and navigation system vendors.

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