

Forum

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Why not provide maritime DGPS with pseudolite service?

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KEY WORDS

1. DGPS. 2. Augmentation. 3. Marine.

I read with interest the article “Ensuring the best availability and continuity of maritime DGPS” in order to comply with the requirements of the Revised Resolution A.815(19) *World Wide Radionavigation system* (Moore *et al.*, 2002). The Resolution requires signal availability $\geq 99.8\%$ over a 2-year period and continuity of service $\geq 99.97\%$ over a period of 3 hours *for navigation in those harbour entrances, harbour approaches and coastal waters with a high volume of traffic and/or a significant degree of risk*. Although not specified in the Resolution, IALA recommends in her “Recommendations on the Performance and Monitoring of DGNSS services in the Band 283.5–325 kHz” to augment GNSS in these areas with 2 or more DGNSS stations in order to be able to comply with the IMO requirements.

The revised IMO Safety of Life at Sea (SOLAS) Chapter V has been in force since 1 July 2002. It requires all ships to which the Convention applies to be fitted with a receiver for a global navigation satellite system or a terrestrial radionavigation system, or other means, *suitable for use at all times throughout the intended voyage to establish and update the ship's position by automatic means*. In practice this requirement can only be met with an available GPS signal in space and a working receiver equipment on board. On most modern ships (D)GPS is the only source of position information to the electronic chart (ECDIS) and to the mandatory on board transponder of the Automatic Identification System (AIS). On high-speed craft and on one-man-bridges in particular there is little time to cross check navigation performance with other available information, such as radar. False position information to the AIS could even lead to “AIS assisted collisions”.

The VOLPE report on GPS vulnerability recommends that public policy must ensure, primarily, that *safety is maintained even in the event of loss of GPS*. The reasons for possible loss of GPS are well described in the VOLPE report and in other publications. However, IMO or other maritime bodies do not yet address solutions for the case of loss of GPS. The future of the Northwest European Loran-C system is unsure after the end of the agreement between the participating countries in 2005; and many other maritime areas are not covered by Loran-C. Other terrestrial radionavigation systems for maritime application have been phased out. The

combination of GPS and Galileo will increase the availability of signals in space and the possibility for Receiver Autonomous Integrity Monitoring (RAIM), but Galileo is also vulnerable to interference or jamming.

A possible solution for a GNSS back up in areas with coverage of two or more DGNSS stations is to add a pseudolite function in the jam resistant 283.5–325 kHz band to the DGNSS stations. A new challenge for manufacturers and the (public) service providers in the maritime sector!

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REFERENCE

Moore, T., Hill, C. J. and Monteiro, L. S. (2002). Maritime DGPS: Ensuring the Best Availability and Continuity. This *Journal* 55, pp. 485–494.

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The Use of VHF in Collision Avoidance at Sea

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KEY WORDS

1. VHF. 2. Collision Avoidance. 3. IMO.

In the article “The ALVA CAPE and the Automatic Identification System: The Use of VHF in Collision Avoidance at Sea” (Harding, 2002) the author draws attention to the differences between the requirements of US legislation and the guidance issued by the United Kingdom and by IMO. In my opinion the article gives some misleading information about the IMO position.

As the author explains the US Vessel Bridge-to-Bridge Radiotelephone Act of August 1971 requires that vessels over 20 m in length must carry a VHF radio in US waters and shall, when necessary, transmit and confirm on the designated frequency (channel 13) the intentions of the vessel and any other information necessary for the safe navigation of vessels. UK guidance on the use of VHF for collision avoidance is given in Marine Guidance Note MGN 167, published in January 2001. This Note supersedes MGN 27 published in August 1997. MGN 167 warns of the dangers of using VHF.

As explained in the article IMO has adopted amendments to SOLAS Chapter IV on GMDSS requiring each ship over 300 gross tons to carry a VHF installation to provide communications on channels 13 and 16 and to maintain a continuous watch on channel 13. The author considers that the IMO regulations are broadly similar to the US Bridge-to-Bridge Radiotelephone Act but the SOLAS regulations do not

require a ship to transmit and confirm the vessel's intentions for safe navigation. There is no IMO guidance as to the use of VHF radio for collision avoidance. It is, therefore, not correct to say that the guidance issued by the UK Government is clearly out of line with internationally (IMO) adopted practice.

After discussing the court judgements relating to the collision between the MINERAL DAMPIER and the HANJIN MADRAS the author notes that none of those providing advice to the court, including the Elder Brethren of Trinity House, appear to have made any reference to the direction issued by IMO regarding the use of VHF radio in collision avoidance. He suggests that the court may have reached a different opinion if so advised. In fact IMO has not issued any direction as to the use of VHF for this purpose.

The article gives three examples of collisions considered to have been preventable if the ships' navigators had used their VHF radio to agree or otherwise confirm their manoeuvres. Each of the collisions occurred in US pilotage waters. Numerous examples could also be given to illustrate how the misuse of VHF has contributed to collision. Perhaps the most notable example is the collision in the Black Sea between the passenger ship ADMIRAL NAKHIMOV and the bulker PETR VASEV in August 1986. The two vessels were crossing so as to involve risk of collision in clear visibility. ADMIRAL NAKHIMOV was the give way ship with PETR VASEV on her starboard bow but agreement was reached on VHF that PETR VASEV would keep out of the way. PETR VASEV took no action until it was too late to avoid collision. The ADMIRAL NAKHIMOV sank with the loss of 423 lives. Both masters were sentenced to 15 years imprisonment.

What is the mariner to make of the different advice or requirements as to the use of VHF radio for collision avoidance? The US Bridge-to-Bridge Act calls for navigators to transmit and confirm their intentions and any other information necessary for the safe navigation of vessels. The US courts have tended to find fault with vessels for failing to make use of VHF radio for collision avoidance. On the other hand the UK Marine Guidance Note MGN 167 warns of the dangers of using VHF for collision avoidance and UK courts have often criticised vessels for misuse of VHF. On the face of it there would appear to be opposing attitudes but the differences may not be substantial. MGN 167 accepts that the practice of using VHF radio as a collision avoidance aid may be resorted to on occasion, especially in pilotage waters. In the case of HANJIN MADRAS/MINERAL DAMPIER the UK Court of Appeal pointed out that there should be no embargo on all VHF communications about navigation between two vessels which are passing or are approaching a close quarters situation. It was acknowledged that the Admiralty Court tends to experience cases where VHF conversations have led to disastrous misunderstanding and does not become aware of cases where an exchange of VHF information has assisted safe navigation.

The UK Appeal Court in the above case set out some examples of proper use of VHF. Where two vessels approaching one another are in VHF communication it can in some circumstances be helpful if the vessel which is required to give way informs the other vessel of action being taken in order to comply with the collision regulations. Equally there may be circumstances in which the stand-on vessel is justified in asking the give-way vessel what action the latter is taking in order to comply with the collision regulations. Where two vessels are approaching one another in restricted visibility in circumstances where Rule 19 applies a vessel which is taking

avoiding action in compliance with that rule may well assist the other vessel if it informs that vessel on the VHF of the action being taken.

The essential point is to avoid the misuse of VHF. In particular VHF should not be used to agree on a course of action which is in conflict with the collision regulations. Any vessel which makes improper use of the VHF radio in the approach to collision is likely to be held at fault by the courts of any country. On page 440 of the article the author quotes from the proposed US regulations dealing with AIS but the passage quoted relates only to the lower Mississippi River. The issuance of US rules dealing with AIS carriage throughout US waters remain under development.

REFERENCE

Harding, S. J. (2002). The 'ALVA CAPE' and the AIS: The use of VHF in Collision Avoidance at Sea. This *Journal* 55, pp. 431–442.