

Automatic Identification Systems (AIS) - Collision Avoidance and Vessel Tracking

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If you've completed more than a handful of Mac races, you've probably spent a few-watch hours on a moonless night or in heavy fog staring into the abyss. You consciously weighed the cost, windage, and power requirements of radar and wished for a better way of avoiding the risk of colliding with unseen vessels.

An increasing number of sailors have addressed this concern by including Automatic Identification Systems (AIS) as part of their electronic instrumentation and safety systems. What was once an expensive but international requirement for ocean-going commercial vessels is now becoming a relatively affordable option for recreational boaters. The same post-Titanic organization that gave us the International Convention for the Safety of Life at Sea (SOLAS) standards, introduced the new "AIS Lite" Class B (and later Bs) standard in 2006. Since that time, vendors have produced AIS products that display much more data than binoculars, radar, or your foredeck crew ever could.

Automatic Identification Systems (AIS) provide tracking info on other AIS-equipped vessels including Name, Speed (SOG), Course (COG), Position (lat/lon) and Heading, etc -- important information when contacting or avoiding collisions with nearby vessels. An AIS device will use the same unique MMSI (Maritime Mobile Service Identity) number that is required when registering your VHF/DSC radio.

INSTALLATION

Typical recreational boaters will choose AIS Class-B transceivers to both send and receive data. Some systems offer a 'receive-only' switch (the 'stealth option') which offers the ability to save on battery power or withhold your location from other racers (and unfortunately also large freighters) during clear-weather racing, etc. Class-B AIS units have internal GPS and thus require both GPS and VHF antennas. Naturally, the GPS antenna is used to receive GPS satellite location signals. The VHF antenna is used to communicate with other nearby vessels and land-based AIS stations. You can use an antenna splitter to share the VHF antenna with your existing radio, as AIS uses VHF Channels 87 & 88. Some AIS units come with dedicated displays. Most units are standalone boxes that will integrate with existing chart-plotters or on-board computers via NMEA 0183 hi-speed (38.4kbps) or NMEA 2000 protocols. NMEA 2000 is often preferred as it provides for better future system improvements.

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Because AIS uses standard VHF frequencies/technologies for ship-to-ship communication, there is no ongoing fee/cost once the unit is purchased and installed – it just works. Like VHF radios, it is generally limited to line-of-sight ranges (~20-40 miles) -- fine for ship-to-ship collision avoidance. Some land-based receivers also collect, aggregate, and publish real-time coastal AIS information (free on the internet – links below). Some satellite operators also gather open-sea AIS info and offer it as a service. However, satellite based VHF AIS reception was not part of the original AIS design intent and has some technical limitations (beyond the scope of this article).

Also, it should be obvious AIS is only useful for identifying & tracking other ships with AIS installed (but at least you'll have large commercial vessels covered and it is becoming more popular with private recreational boaters/sailors as well).

USAGE: Tracking

You may have already imagined AIS as a tracker that can identify your boat's current location on-demand for remote viewing (i.e. on the internet via public websites). These websites overlay coastal AIS coordinate and tracking data onto maps. You can see the current location of a single vessel, a fleet, or all the vessels in a geographic area. Often, course tracks over a given time period are also available. This is helpful for land-based tracking of delivery crew progress, cruising guest arrival times, or your position relative to storms, etc -- similar to the "Yellow-Brick" trackers used during our Mac races, but that is available all the time (within coastal range coverage or via private open-sea satellite operators).

USAGE: Collision Avoidance

You can also set alarm parameters on your chartplotter (if so equipped), so your AIS system will alert you when it senses another AIS equipped vessels that may be a collision concern (time or distance). Or, upon hearing a loud fog horn you may become concerned that its associated vessel might be an issue for you -- an AIS device could allow you to identify the vessel on your chartplotter. AIS would also allow you to hail the target vessel on channel 16 by name and instruct them to switch to a free VHF channel. You could then identify your boat, confirm they see you, ask if they plan to stay their present course, and follow-up with appropriate collision avoidance actions.

After you do this a few times, you will probably just rely on the AIS screen information. You will be confident that you no longer need to hail the other vessel. In the end, you can simply behave as two ships passing (safely) in the night.

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Note: If you do not have an AIS on-board, but do have internet access (coastal or sat-based cellular data), you can also use popular AIS phone/tablet "apps" to alert you to other AIS based vessels nearby. But this is not as "fool-proof" as direct ship-to-ship AIS, and other AIS vessels will not be notified of your position – so a watchful lookout is still recommended.

GOVERNMENT WEB SITES FOR MORE INFO

<http://www.navcen.uscg.gov/?pageName=AISmain>

<http://www.imo.org/ourwork/safety/navigation/pages/ais.aspx>

AIS TRACKING SITES LIST

<http://www.marinetraffic.com/ais/>

<http://www.vesseltracker.com/en/Area/greatlakes/Map.html>

<http://shipfinder.co/>

Class A vs Class B

https://www.navcen.uscg.gov/pdf/AIS_Comparison_By_Class.pdf

AIS-SART (Search and Rescue Transmitter)

AIS technologies have also been used to create dedicated emergency location identifying devices (AIS-SARTs). The approach is generally not as robust as EPIRBs/PLBs which use dedicated satellite transmission and direct notification/connection to governmental search and rescue teams (USCG). However, AIS-SART signals can be received directly by other potential nearby commercial vessels which might be advantageous on the open ocean near shipping lanes, etc.



If you have any questions, please contact us at safety@byc.com, macchair@byc.com, office@byc.com or through the BYC office @ 313-822-1853

Note: The purpose of this article is to highlight concepts for how you and your crew can race as safely as possible. As always, ultimate responsibility for the safety of the crew and the decision whether to race or to stop racing is that of the skipper (RRS4, MSR2). This email is meant as a courtesy only and you should always refer to the Notice of Race, Sailing Instructions and Safety Regulations, which govern the race.

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