AIS – What's it all about?

By Bill Tucker

The abbreviation AIS stands for Automatic Identification System. Over the last couple of years it has become a more popular electronic gadget on private yachts including several GLSS boats. The system is primarily intended to assist in avoiding collisions between boats and ships. AIS provides a means for communicating key information including a vessel's identification, location, course and speed between vessels and also vessel traffic control systems.

There are two classes of AIS system in use today. Class A systems meet SOLAS requirements and are required for commercial vessels. Class A systems can both transmit own vessel information and receive information from other vessels. Class B systems are used on private vessels and may only receive information but need not transmit own vessel information. There are a number of differences between the Class A and B systems. The Class B systems are less expensive, and also less sophisticated. For example the Class B systems do not transmit at as high a power, do not send as much information about the ship, and do not send the information as frequently. The two systems can receive information transmitted by either system.

Class B system are made by several manufacturers and can be configured in a variety of different installations. The information received may be displayed on a chart plotter or radar showing other ships location, course and speed or it may be displayed in a table. A typical system will use the received information along with own ships information to determine the closest point and time of approach by each ship tracked. If the closest point of approach is closer than a preset distance an alarm will sound warning of a possible unsafe condition or possible collision. This collision warning methodology is similar to that used in most radar systems.

All class A system and class B systems with transmit capabilities transmit their information on VHF frequencies in one of 2250 time slots per minute. The system uses a sophisticated logic and monitoring arrangement to keep one vessel from stepping on the signal from another. Class B systems may use the same VHF antenna as the VHF radio by use of a multiplexer or they may use a dedicated antenna.

You can learn more technical details about AIS by Googling "Automatic Information System", but don't try just "AIS" or you will discover just how many organizations have those letters as an abbreviation. For more information on the practical application of AIS we asked several GLSS members who have AIS installed to tell us about their experience:

John Ayres - John sails <u>REP TIDE</u> a 1987 Cal 33 MKII. He has a Furuno FA-150, Class A system that has been installed through 2 racing seasons. Here is what John has to say about his system:

Currently the FA-150 is a standalone system with an auxiliary alarm and Multi-Function Display. I am working on interfacing the system with my Garmin Chart Plotter which may eventually be up-graded to a PC or Furuno Nav-Net Chart Plotter. I chose this system because the Multi Function Display was the exact size (6"X9") as my old Raytheon Loran Display and did not require a Nav-Station tare-up. The Class A also enables texting and user selectable Navigation Information to be transmitted. This unit contains two separate GPS's and VHF Radios. I use the system primarily for identifying other ship traffic and collision avoidance. I like to see what

the other vessels in my immediate area are engaged-in (Push/Tow/ Moored etc.).   I like to know what my "CPA and TCA" (Closest Point of Approach and Time to Closest Approach) is doing and possibly plan ahead to increase these values as necessary. Based on my experience I would pass on the following observations:

- The Lakers do not always up-date their destination information if they are constantly making the same trips back-and-forth in the lakes. In other words, they may actually be sailing away from the destination they are transmitting.
- Calling Vessels by name always gets a response over the VHF when they can identify you on their AIS.

The AIS system offers quick concise information regarding vessel traffic in your area and the risk of collision. In a marginal crossing situation I like to consider it a courtesy to hail the Vessel Traffic to let them know that I will be "tacking" (taking action) to increase the CPA.   It is also much more likely for Vessel Traffic to contact you over the VHF when they see all of your navigation information (boat name, speed, course etc...) to discuss safe passage.

Ken Verhaeren – Ken sails KISMET a 1987 Nonsuch 30 Ultra.   He has a West Marine Class B system installed for one sailing season with both transmit and receive capability. Here is what Ken has to say about his system:

Basic installation was simple and was mostly plugin. Connection to the chart plotter was more involve and requiring discussions with both Garmin and West Marine for correct wiring. My primary considerations in choosing this AIS were cost and compatibility with my Garmin chart plotter. Generally my system provides boat name, heading, speed, and closest point of approach. Heading back from the KING'S CUP in 2010 I seemed to be on a collision course with a laker. It provided information that cleared up the situation and also allowed me to call the ship by name. The year prior to installation a laker wanted to contact me and could only call for "the vessel in the location of". Had I had the AIS then, he would have called me by name. I would buy an AIS prior to radar. The cost is much cheaper and gives you information that can prevent a serious problem. AIS also allows you to "see" another boat much sooner and to make plans accordingly.

David Amatangelo – David sails a 1980 Tartan 33, 1980 named VENTURE 30103. David has a Class B, receive only AIS installed, which is also his VHF radio, a Standard Horizon Model 2100. It has been installed for one sailing season. Here is what David has to say about his system:

My AIS VHF radio combination is hooked up into my Garmin chart plotter, a model 546s. I have my Garmin installed so I can swing it into the companion way, the screen on the radio is quite small and the radio is down by the chart table. This way I have a visual picture almost 100% of the time of the freighters on the lake that are close to me. My chart plotter screen is about 3 x 4.5. I chose this system because I needed a new radio, and last year 2010, is when the Standard Horizon model with the AIS first came on the market. I spending a little more for the radio and was able to have the advantages of the AIS system without the need for a special receiver. The receiver would have cost more than the radio and might have needed its own antenna.   The most important part is it's picking up primarily freighters that I am unable to see. It tells me who they are, course , speed, and with the setup there is also a warning range based on my position that I can set up on the radio from 1 mile up to a 50 mile radius. Last year there were a number of us near Long Point between 12:00 midnight and 1:00 AM. There was a good amount of traffic and one freighter that I could see very easily but visually I could not tell

which way he was going. The target range on the chart plotter helped me understand how he was moving and I called him on the radio to ask how he would prefer we pass one another. I was able to call the vessel by name and I was reassured that he knew who I was and more importantly where I was. I could also tell where Bill in GL[3] was at all times as well. I found that very frustrating because he was in front of me and I wasn't closing the gap. Having AIS on board just made me feel a lot more comfortable especially if I was going down for a nap it could see farther than I could plus I had a much better feeling if there was a freighter on the horizon I knew it's course and speed.

Blair Arden – Blair sails Otis B. Driftwood a Columbia 26 Mk2. For two racing seasons he has had a Class B receive only AIS installed a Smart Radio SR161 AIS Receiver and a Vesper Marine AIS WatchMate display. Here is what Blair has to say about his system:

On my boat, because my GPS provides NEMA data to a number of my instruments, I created a "GPS buss." When I added AIS, I created a parallel "AIS buss" that is tied to the GPS buss for power and GPS data in. The AIS output can be seen on my chart plotter, but since it is off most of a challenge, AIS information is also sent to a dedicated AIS display. I have also noted that the dedicated display is much better suited to AIS than my chart plotter. Even when everything is on, I only use the data from the dedicated display. I chose this system because on my boat, power usage and power conservation are critical. I do not have the ability to charge batteries once I start the challenge. I do not continuously run my GPS chart plotter, but its antenna is active, meaning it is always sending NEMA data even when the chart plotter is off. That data is fed to my AIS receiver, which combines it with the decoded AIS signal, and sends the result to the WatchMate display. Together, my AIS receiver and the WatchMate draw about 0.2 amps, making this solution the lowest power draw of all the available options. My display provides a radar-like display of all vessels (with their name) within the selected range. It computes the bearing and range to each vessel. It computes the closest point of approach (CPA) and time until CPA (TCPA). Alarms may be based on these and other factors. Having the vessel name makes for easy and professional communication with them. I have been able to comfortably travel in thick fog, where previously I would have been very nervous. I was able to give others a heads up that they were on a collision course with a ferry in Lake Erie.

Bill Tucker – Bill Sails GL3 a 1979 Beneteau First 30. He has had a Raymarine 500 Class B AIS Transceiver with both transmit and receive capability. It is connected to a Raymarine C70 chart plotter.

The Raymarine 500 is basically a black box that interfaces with the C70 plotter to provide both a graphical display of target vessels and a table with appropriate information. The Raymarine 500 comes with a dedicated GPS antenna which I mounted on the deck near the stern. I also installed a dedicated VHF antenna on the stern rail but wired the system so I could use either the antenna on the stern or my mast head VHF radio antenna through a multiplexer in the AIS unit. The stern mounted antenna proved quite adequate. Since the multiplexer would reduce the signal to my VHF radio I chose to use the stern mounted antenna. The Raymarine 500 is not fully compatible with the C70 chart plotter so to turn off the active function the GPS transducer can be unplugged from the AIS module. The Raymarine 500 was selected primarily because it was compatible with the rest of my Raymarine instrumentation. I wanted an active system so that others would know where I was. The system displays both target information on the chart plotter and a table listing all the contacts. One can click on the targets to display added data such as course and speed. One can also set an alarm distance and time for

closest point of approach. Displays could and user functions could be made easier to use. The system certainly gives a good picture of what the commercial traffic in my area is doing. I wish all the small vessels, GLSS competitors in particular, also used the system in the active mode.   Last year during the Erie Solo Challenge there was a lot of traffic as I approached Long Point. Blair Arden called me and told me a freighter was trying to contact me on Channel 16. I usually monitor Channels 9, 16 and 72 but I had failed to put my radio back in the monitor mode after a conversation on channel 72. I talked to the freighter who was coming out from behind Long Point with several other freighters in a crossing situation and agreed to change course slightly to give him more room. After the race Blair told me he found my active AIS quite annoying as it frequently gave him alarms. I told him the solution was simple, he just needed to increase the alarm radius and stay farther behind me.