Getting the Most from your AIS System

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What I’ll cover…

- What is AIS?
- Choosing an AIS system
- Installation
- Customizing your AIS system
- Testing

Integration with other systems
- Antennas
- Wiring
What is AIS?

• AIS = Automatic Identification System
• Primary use: collision avoidance, secondary use: vessel tracking
• AIS is a broadcast transponder system, operating in the VHF maritime mobile band (channels 87B & 88B)
• Transmits ship information such as identification, position course, speed and more to other vessels and shore
• Uses 9 digit MMSI (Maritime Mobile Service Identity) as unique identifier
• Types of AIS devices
  • Class A: mandated for use on SOLAS and other types of commercial vessels
  • Class B: for use on recreational and small commercial vessels (CSTDMA & SOTDMA)
  • Other devices: AIS receivers, SART, MOB, EPIRB, AtoN, trackers
• Transponders use integrated GPS to fix own position and transmit info via VHF
• Approximate transmit range: Class A = 30+ miles, Class B CS = 5-7 miles, Class B SO = 15 miles, AIS MOB = ~2 miles
• Class B must be preprogrammed with vessel info by dealer
• NOT a replacement for radar or other watch methods
The yacht’s AIS (1) is exchanging info with a freighter (2) receiving signals from a virtual AtoN (Aids to Navigation) (3) receiving a signal from a channel marker (4) displaying the distance and bearing to an MOB via an AIS beacon (5) and calculating if on a collision course with a fishing boat (6)
Choosing an AIS system

Start with some basic questions...

1. AIS receiver or transponder?
   a) If receiver, standalone or integrated with a radio? Integrated splitter?
   b) All transponders / transceivers are also AIS and GPS receivers.

2. What will you connect it to?
   a) NMEA 0183, NMEA 2000, USB, Wi-Fi, Ethernet?
   b) Need Wi-Fi for connection to iPads and other mobile devices?

3. Transponder transmit power
   a) 2 watt or 5 watt? Or even 12.5 watt Class A?

4. VHF/AIS Antenna
   a) Use a dedicated VHF/AIS antenna or an antenna splitter?
   b) Integrated antenna splitter or separate splitter?

5. Other features
   1. Integrated display?
   2. Multiplexing of other NMEA data? Handy for routing data to Wi-Fi / USB connected devices
   3. Multiple NMEA 0183 inputs / outputs? GPS data sources?
   4. Crossing an ocean or going to Alaska? Consider satellite message 27 support?
   5. Enhanced alarms

See our AIS Transponder Comparison Guide for detailed information
Let’s get started…

Get an MMSI number from FCC, BoatUS or other provider

Consider where to install the AIS system

Power source: preferably same 12-24 VDC circuit as VHF radio

AIS/VHF antenna: if using a splitter, install near the radio, otherwise plan out the cable run and antenna location for dedicated AIS/VHF antenna

GPS antenna: if integrated or used inside, install in area without metal directly above

Integration with other devices: near NMEA 2000 backbone, cable runs for NMEA 0183 devices, USB cable limits for computer connections, Wi-Fi

Map out which devices will be connected to AIS
Typical Class B AIS Installation
Antennas for your AIS system

- All AIS transponders require a GPS and AIS/VHF antenna
- GPS antenna
  - GPS antenna types: integrated in AIS device case, portable “puck” interior antenna, external marine-grade “mushroom” antenna
  - GPS antenna can be installed inside or outside the cabin on fiberglass boats
  - Make sure there is no metal directly above the GPS antenna location
  - Transponder will not transmit if it does not have a good GPS signal
  - Can I use my existing GPS? Usually not, but yes with the AMEC CAMINO series

- AIS/VHF antenna
  - Be far the most important factor for good AIS performance
  - Consider a VHF/AIS antenna splitter: simplifies installation and they work!
  - Ideal tuning: wide bandwidth 159 MHz for shared antennas, 162 MHz for dedicated
  - At least 4 foot separation from other vertical metal, higher the better
  - Know your VSWR: some AIS transponders will not work with high VSWR
  - See my blog article for lots more info

- Wi-Fi antenna
  - Most AIS devices that support Wi-Fi (e.g. Vesper XB-8000, AMEC B600W, em-trak B360) Wi-Fi antenna is embedded in AIS device case, some (e.g. AMEC CAMINO-108W) have a separate Wi-Fi antenna
  - Lots of metal wiring and clutter around AIS device can cause reduced Wi-Fi range or drops

Connect your antennas before powering up your AIS device
Connection to display devices

• Connect an AIS device to a supported chartplotter, computer or mobile device to see AIS targets overlaid on charts, enable collision alarms and more

• Connection methods (we’ll cover each in a minute)
  • NMEA 0183: connect AIS TX wire pair to chartplotter NMEA RX wire pair, set port speed to 38400 baud, enable AIS display layer
  • NMEA 2000: connect NMEA 2000 drop cable from AIS device to NMEA 2000 T-connector on NMEA 2000 backbone, enable AIS layer on displays
  • PC or Mac via USB: load USB driver, connect the included USB cable from AIS device to computer, setup inbound port in navigation app for 38400 baud
  • Wi-Fi: see next slide for details...
Typical NMEA 0183 Installation

"READ YOUR MANUAL!"
Every device is different

Vesper XB8000 NMEA 0183 connections
- Output port is always 38400 baud default
- Connection to inbound port is optional, generally not connected
- Some AIS units support multiplexing any inbound NMEA data

Garmin 7xxx NMEA 0183 connections
- Change NMEA port 1 rate to 38400 baud aka “NMEA-HS”
- Turn on AIS layer or display
- Some devices use common ground vs. a dedicated negative signal wire
Typical NMEA 2000 Installation

“Plug and play” – auto discovery of devices
Wi-Fi Connectivity

- Some AIS devices support Wi-Fi: Vesper XB-8000, AMEC B600W, em-trak B360, SI-TEX MDA-5
- What does this mean?
  - AIS device can be used to wirelessly send AIS and GPS data to connected devices including iPads, Android devices, PCs and Macs
  - Support for popular apps (e.g. Navionics, iNavX, OpenCPN, iSailor, iRegatta)
  - Some AIS will multiplex other NMEA data with AIS & GPS over Wi-Fi (e.g. wind, depth, heading)
Wi-Fi Setup

• Join mobile device to AIS Wi-Fi network
• Make sure your app supports AIS over a network connection
• Note the network protocol, IP address and port for your AIS device e.g. Vesper uses
  • IP address: 192.168.15.1
  • Port: 39150
• Configure your app with network settings
• Connect and verify data stream
• Navionics will self-configure once Wi-Fi connection is established
USB Connectivity

- All AIS transponders support USB connections
- What does this mean?
  - AIS device can be used to send AIS and GPS data to computers over USB
  - Support for popular nav programs (e.g. Coastal Explorer, TimeZero, OpenCPN)
  - Some AIS will multiplex other NMEA data with AIS & GPS via USB (e.g. wind, depth, heading)
  - Normally limited to 16 feet
Customizing your AIS setup: DSC calling

- Tie into AIS-enabled radio via NMEA for DSC calling
- Allows you to select an AIS target on the radio and push call for a DSC call
- Not all AIS-enabled radios do this
- New AIS + VHF radio “coming soon”
  - Vesper Cortex will combine SOTDMA Class B with Wi-Fi into a VHF radio
  - Wireless (or wired) displays for AIS and VHF radio communication
  - Adds other capabilities such as monitoring
Customizing your AIS setup: AIS safety devices

Use AIS MOB, EPIRB & SART devices for enhanced safety

- **AIS Man Over-Board devices (e.g. Ocean Signal)**
  - Support AIS MOB alerts with position on displays
  - Some do DSC as well
  - Alarms sound on AIS and radio when activated

- **AIS Search & Rescue Transponder aka SART (e.g. AMEC)**
  - Commercial use but also valuable on long distance recreational vessels
  - Helps to pinpoint location as rescuers approach

- **AIS EPIRB (e.g. McMurdo)**
  - Combines traditional EPIRB with AIS SART
  - Satellite EPIRB for initial distress notice to rescue authorities
  - AIS SART for line of sight location

All are waterproof, portable and can be automatically or manually activated
Customizing your AIS setup: Multiplexing

• AIS transponders from Vesper and AMEC support “multiplexing” NMEA data

• What does this mean?
  • Combines sensor data and acts as a gateway to other connected devices
  • Combine inbound NMEA data or sensor data available on NMEA 2000 to be combined with AIS and GPS data
  • Examples are heading, depth, wind, speed
  • Gateway data sent to connected devices e.g. USB, Wi-Fi, other NMEA devices

*Very useful for sending all vessel data to a Wi-Fi connected iPad or PC*
Customizing your AIS setup: Satellite tracking

- AIS is not designed for tracking but ...
- Tracking via online site is very popular
- AIS VHF transmission limited to line of sight but satellites have the potential to receive AIS transmissions
- AIS Message 27: long-range automatic identification system broadcast message for Class A and Class B “SO”
- Consider Class B SOTDMA (5 watt) or even Class A (12.5 watt) if going offshore and want satellites (and friends & family) to see you
- MarineTraffic: track a single vessel for $23.00 per month
- Other options might make more sense for offshore tracking (SPOT, InReach)
AIS Satellite tracking

Courtesy of exactEarth
Customizing your AIS setup: Public profile

Use services such as MarineTraffic to “claim” your vessel and add pictures and as much info as you want to share (e.g. name, cell number)

See how the USCG sees you...
Customizing your AIS setup: Alarms

• Main function for AIS is collision avoidance
• Some units have built-in alarms but typically alarms are set up and sound on the display device
• Collision alarms based on 3-4 settings:
  • Closest point of approach (CPA) e.g. 1 nm
  • Time to closest point of approach (TCPA) e.g. 5 min
  • Turning AIS alarms on
  • In some cases, other filters e.g. stationary are safe
• Alarm profiles are possible on Vesper Vision2 & Vesper apps
• Alarms are typically audible as well as visual
• Other alarms e.g. anchor alarm can be tied into AIS
Vesper *smartAIS®* anchor watch solution

Wind direction/ speed alarms at anchor
Get alerted with change in wind direction or wind speed.

Depth alarm at anchor
 Warns you if the water depth falls below a certain level.

**Plus** the benefit of letting others know where you are and collision alarms.
Customizing your AIS setup: Radar integration

Furuno Wireless Radar + AIS on iPad

Complete solution for navigation, AIS and radar for the iPad
• FURUNO 1st Watch Wireless Radar
• TimeZero (Nobeltec) TZ iBoat app for iPad
• AIS transponder with Wi-Fi and multiplexing
  • Vesper XB-8000
  • AMEC B600W
• Heading sensor
  • E.g. from autopilot
• Total HW/SW solution cost around $2000
Testing your AIS setup...

✓ Make sure all antennas are connected and in position before powering up
✓ Power up and wait 5-10 minutes before proceeding
✓ Check the LEDs – most have a GREEN LED showing proper operation
  • Other LEDs show AIS RX (lots of flashing) and TX (once every 3 minutes at rest)
✓ Run the manufacturer software (vmAIS, AIS Config, ProAIS2) or mobile app
  • Ensure the unit is programmed correctly, including interface settings
  • Check the diagnostic pages for power, GPS, AIS received and sent, VSWR
✓ Check display devices to ensure AIS targets show up
✓ After half hour, check MarineTraffic.com if you are in an established area
  • Not always seen by MarineTraffic, but if you are, you’re typically transmitting ok
✓ Best AIS transmit check: go out on the water, call another recreational AIS vessel you can see and ask if they see you and is the information correct
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Thank you and safe boating!