How AIS Makes You Safer on the Water

By Jeff Cote

Pacific Yacht Systems Inc.
A Little about PYS

• 11 years in business
• Genesis: wanted a reliable and safe electrical system
• What makes us different
  – Expertise through specialization & repetition
    • 2017: Over 750 boats
    – Teamwork breeds synergy
• Team members
  – Detailed oriented
  – Passion for doing it right the 1st time
  – Our installations are safe and follow: ABYC and NMEA standards
Purpose of Presentation

• How does AIS improve vessel safety?
• Why is the location of AIS antenna relative to VHF antenna Important?
• Can a regular VHF Antenna be used with AIS?
• What is a good approach to determine the EMI Problem
AIS Fundamentals

• Purpose: Increase Vessel Safety ↔ Reduce VHF Traffic
  – Automatic Exchange of Navigation Information
  – Vessel to Vessel
  – Vessel to Shore

• Periodic Broadcasts of Vessel’s Own Data

• Made Available to
  – All AIS-Equipped Vessel Operators
  – Shore-Based Traffic Control Operations
AIS Usage

• Displays surrounding traffic
  – See local commercial traffic
  – Plan a narrow passage or bridge
  – Hail other vessel by name

• Receive-only vs transmit & receive

• Collision alarm
AIS Classes & Installations

- **Class A - Required**
  - 2 to 10 second interval while underway
  - 3 Minutes while at Anchor
  - Supplemental data at 6-minute intervals

- **Class B (Same as Class A Except:**)
  - 30-second Interval while Underway <14 knots
  - Fewer Required Parameters

- **Receive Only AIS Installations**
  - Useful for Non-mandated Vessels
AIS Freq & Reach

- AIS transponders and receivers use two VHF radio frequencies:
  - 161.975 MHz (AIS1, or channel 87B) and
  - 162.025 MHz (AIS2, or channel 88B)
- Since AIS uses the same VHF frequencies as marine VHF
  - similar radio reception capabilities which is basically line of sight.
  - the higher your VHF antenna is mounted the greater the reception area
- Reception from Class A vessels that are 20 or even 30 miles away on open water is not uncommon
- Class B transponders use lower power for transmissions,
  - expect Class B vessels to be acquired when they are 5 to 7 miles away.
New AIS Antenna or Splitter

- Depends on boat type and layout, compromise between:
  - Higher the better
  - Not too close to other VHF antennas
- One option installed a powered VHF/AIS splitter
AIS Configuration

- Vessel Data
  - Maritime Mobile Service Identity (MMSI) Number
  - IMO Vessel Number
  - Radio Call Sign
  - Vessel Name
  - Vessel Type
  - GPS Location/Reference Position
GPS Reference Location

When Reference Location Unavailable, Use: A = B = C = D = 0

When Reference Location Unavailable, Vessel Dimensions in B, D
A = C = 0, B ≠ 0, D ≠ 0

<table>
<thead>
<tr>
<th></th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 – 511 m</td>
</tr>
<tr>
<td></td>
<td>511 m = 511 m or Greater</td>
</tr>
<tr>
<td>B</td>
<td>0 – 511 m</td>
</tr>
<tr>
<td></td>
<td>511 m = 511 m or Greater</td>
</tr>
<tr>
<td>C</td>
<td>0 – 63 m</td>
</tr>
<tr>
<td></td>
<td>63 m = 63 m or Greater</td>
</tr>
<tr>
<td>D</td>
<td>0 – 63 m</td>
</tr>
<tr>
<td></td>
<td>63 m = 63 m or Greater</td>
</tr>
</tbody>
</table>
Avoiding EMI Problems

• Layout and Space Planning
  – Identify Potential EMI Radiation Sources
  – Identify Potential EMI Conducted Sources
  – Avoid Potential Hot Spots
Finding EMI Problems

• Trial-and-Error Process of Elimination
  – Turn off All Equipment Except for Affected Device
  – Turn on a Device and Check for Symptoms
  – Repeat Until Interference Symptoms Return

• Additional Testing May Be Required to Determine If Interference Is Radiated or Conducted

• Interference May Be Radiated from Cables Connected to Interference Source
Other Mitigation

- Relocate Cable Runs
- Relocate Equipment Displays
- Relocate Antennas
  - Consider Antenna Radiation Patterns
- Consider Cable Lengths
  - Avoid Multiples of ¼ Wave Length
Vesper Advantages

• AIS Transponder - Collision Prevention
  – Continuously determine crossing situations, receive collision alarms with full vessel information for critical action

• Anchor Watch
  – Sleep soundly, knowing you’ll be alerted if your anchor is dragging.

• Man Overboat
  – Be alerted when your crew activate an AIS MOB device and see their current location for easy retrieval.
Vesper AIS Features

- NMEA gateway
- High resolution GPS (5Hz GPS update)
- Update SW easily via tablet or smartphone
- Low power consumption
- Galvanic isolated USB ports
- Fully Waterproof IPx7
- Vesper Watchmate App compatible
- External Alarm
- Silence mode
#1 Vesper XB-8000
#1 Vesper XB-8000

- “Blackbox” AIS Transponder and Receiver
  - Sends AIS info via Wi-Fi, N2k, NMEA 0183
- Access AIS data via local Wi-Fi on tablet or MFD vis NMEA
- Powerful external GPS included
#2 Vesper WatchMate Vision

- Display with touchscreen interface
- Sends AIS info via display, Wi-Fi, N2k, NMEA 0183, USB
- Built-in GPS receiver (optional external GPS)
#3 SmartFind S20 AIS MOB
Designed to be fitted to a lifejacket
Ready to be activated in the event of a man overboard situation
  - Deploys the antenna and activates the S20
Features a high precision GPS and it will transmit position information and a serialised identity number back via AIS
Transmits continuously for a minimum of 24 hours and has a 7 year battery storage life.
Flashing LED indicator light makes it easier to spot at night
Automatic deployment option (offered when professionally fitted) to compatible lifejackets
#3 SmartFind S20 AIS MOB
<table>
<thead>
<tr>
<th>App</th>
<th>Details</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ShipFinder</strong></td>
<td>- Ship Finder shows live moving ships on a worldwide map</td>
<td><strong>Pros</strong>&lt;br&gt;- augmented reality tool (additional purchase) allows you to take a photo of a boat and it will provide the details</td>
<td><strong>Cons</strong>&lt;br&gt;- not real time, 5 min delay&lt;br&gt;- pop up advertising on free version is too frustrating</td>
</tr>
<tr>
<td><strong>Marine Traffic</strong></td>
<td>- Marine Traffic displays near real-time positions of ships and yachts worldwide. Connected to the largest network of AIS receivers, the app covers most major ports and shipping routes</td>
<td><strong>Pros</strong>&lt;br&gt;- view live wind and 48 hour wind forecasts&lt;br&gt;- playback of boat’s track&lt;br&gt;- augmented reality tool (additional purchase)</td>
<td><strong>Cons</strong>&lt;br&gt;- must have an MMSI number</td>
</tr>
<tr>
<td><strong>Boat Beacon</strong></td>
<td>- AIS marine navigation&lt;br&gt; - Boat Beacon is the only AIS ship plotting app to share your boat’s position, provide Collision Detection and use real-time data</td>
<td><strong>Pros</strong>&lt;br&gt;- friends and family can watch where you are with the free Boat Watch App&lt;br&gt;- do not need an MMSI number</td>
<td><strong>Cons</strong>&lt;br&gt;- requires internet access to work&lt;br&gt;- not an AIS transponder, other boats cannot see you on their VHF AIS system</td>
</tr>
</tbody>
</table>
The PYS Difference

• We are boaters too!
• Expertise through Repetition
• Many electrical “fixes” are indicators of the bigger picture.
• We can help you prioritize safety.
Connect with PYS

• Starting Point: PYS Electrical Audit for your boat
  – 90 minutes: Batteries, DC distribution, charger, alternator, inverter
  – Written report: observations & recommendations
  – Cost: $189

• PYS Design Services for DIYers
  – Electrical system designed by PYS (collaborative and to code)
  – Installed by yourself or other outfit

• Pacific Yachting magazine - Monthly Tech Talk Column

• [www.pysystems.ca](http://www.pysystems.ca) 100s of articles

• Monthly email newsletter
Questions?
Pacific Yacht Systems
marine electronics & electrical

Full-service shop delivering marine electrical and navigation solutions tailored to your vessel and your boating needs.

boating made simple 
by design

design • installation • service • support