



*Installation  
& Operation  
Instructions*

**AISALERT**



# AIS OVERVIEW

Automatic Identification System (AIS) is a relatively recent tool implemented for safety and tracking the positions of ships.

An on-board AIS system, using VHF frequencies, continuously broadcasts the vessel's name, MMSI number, and radio callsign, along with detailed parameters like length, beam, draft, and tonnage. It also broadcasts the vessel's speed, course, destination and rate of turn,

Full transmitting AIS systems are very expensive, but the transmitted information can be received by pleasure boat owners using radios such as the AISALERT with a warning system incorporated, and nearby ships positions then plotted on a "radar" type display on a laptop. Unlike a radar, the display is unequivocal i.e. rain, sea and weather do not display as targets. Of course, neither does land masses or vessels which are not transmitting an AIS signal.

Additionally, as the ships name, MMSI number and radio callsign are displayed; DSC or conventional radio calls can be correctly addressed.

## HOW DOES IT WORK

Each shipboard (or base station) AIS system consists of one VHF transmitter, two VHF TDMA receivers, one VHF DSC receiver, and a standard marine electronic communications link to shipboard display and sensor systems. Position and timing information is normally derived from a global navigation satellite system (e.g. GPS) receiver. Other information broadcast by the AIS, if available, is electronically obtained from shipboard equipment through standard marine data connections. All AIS equipped ships would normally provide heading information and course and speed over ground. Other information, such as rate of turn, angle of heel, pitch and roll, and destination and ETA can also be provided.

The AIS transmitter normally works in an autonomous and continuous mode, regardless of whether the vessel is operating in the open seas, coastal or inland areas, or in port. Although only one channel is necessary, each station transmits and receives identical information over two radio channels to avoid interference problems, and to allow channels to be shifted without communications loss from other ships. Frequencies used are 161.975 and 162.025 MHz

The system provides for automatic contention resolution between itself and other stations, whereby all AIS stations continuously synchronize themselves to each other, to avoid overlap of individual transmissions. Each transmission is only 30/1000 of a second (30mS) long.

The system coverage range is similar to other VHF applications. Its propagation is slightly better than that of radar, due to the much longer wavelength, so it's possible to "see" around bends and behind islands if the landmasses are not too high. A typical value to be expected at sea is nominally 20 nautical miles, and this is largely dependant on the height of both the transmitting antenna (ship) and receiving unit (yacht).

## **WHAT IS BROADCAST BY AIS?**

A Class A AIS unit (see below) broadcasts the following information every 2 to 12 seconds while underway, dependant on ship speed and rate of turn, and every 3 minutes while at anchor, all at a power level of 12.5 watts.

The information broadcast includes:

MMSI number - unique referencable identification

Navigation status – examples are at anchor, under way, not under command.

Rate of turn - right or left, 0 to 720 degrees per minute

Speed over ground – 1/10 of a knot resolution. Range from 0 to 102 knots.

Position accuracy - Differential GPS or other.

Course over ground - relative to true north to 1/10th degree

Longitude and Latitude - to 1/10000 minute

True Heading - 0 to 359 degrees derived from gyro input

Time stamp - The universal time to nearest second that this information was generated

In addition, the Class A AIS unit broadcasts the following information every 6 minutes:

MMSI number - same unique identification used above, links the data above to described vessel

IMO number - unique referencable identification (related to ship's construction)

Radio call sign - international call sign assigned to vessel.

Name - Name of ship, 20 characters are provided

Type of ship/cargo - there is a table of possibilities that are available

Dimensions of ship - to nearest meter

Location on ship where reference point for position reports is located

Type of position fixing device - various options from differential GPS to undefined

Draught of ship - 1/10 meter to 25.5 meters

Destination - 20 characters are provided

Estimated time of Arrival at destination - month, day, hour, and minute in UTC

## **WHICH VESSELS ARE EQUIPPED WITH AIS?**

All ships of 300 gross tonnage and upwards - engaged on international voyages and cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships and tankers irrespective of size shall be fitted with AIS not later than December 2004

ITU-R Recommendation M.1371-1 describes the following types of AIS:

Class A

Ship borne mobile equipment intended for vessels meeting the requirements of IMO AIS carriage requirement, and is described above.

## WHICH VESSELS ARE EQUIPPED WITH AIS? (CONT'D)

### Class B

Ship borne mobile equipment provides facilities not necessarily in full accord with IMO AIS carriage requirements. The Class B is nearly identical to the Class A, except the Class B:

Has a reporting rate less than a Class A (e.g. every 30 sec. when under 14 knots, as opposed to every 12 sec. for Class A)

Does not transmit the vessel's IMO number or call sign

Does not transmit ETA or destination

Does not transmit navigational status

Is only required to receive, not transmit, text safety messages

Is only required to receive, not transmit, application identifiers (binary messages)

Does not transmit rate of turn information

Does not transmit maximum present static draught

### Search and Rescue Aircraft

Aircraft mobile equipment, normally reporting every ten seconds.

### Aids to Navigation

Shore based station, providing location of an aid to navigation. Normally reports every three minutes. This may eventually replace the racon.

### AIS base station.

Shore based station providing text messages, time synchronization, meteorological or hydrological information, navigation information, or position of other vessels. Normally reports every ten seconds.

The above is a brief non-technical overview of the AIS system. For further in-depth information the Internet contains many useful sites. The US Coastguard has much information at [http://www.navcen.uscg.gov/enav/ais/how\\_AIS\\_works.htm](http://www.navcen.uscg.gov/enav/ais/how_AIS_works.htm)

# RADIO INSTALLATION

This unit is designed for 12volt NEGATIVE ground or ISOLATED ground systems only.

This unit is not waterproof and should be mounted in a protected area, e.g. the nav. station.

The radio cannot be physically detached from the cradle/alarm unit. The cradle and radio are intended to be mounted on a horizontal surface, with screws being passed through the two mounting lugs on the cradle into the mounting surface for security in a seaway.

The radio is contained securely within the cradle.

## POWER

Connect to a voltage source of 11.5 to 15 volts dc, via a switch or circuit breaker. Note, the unit itself has no on-off switch, just a mute function.

Avoid connection to engine start batteries.

Two power connection leads are supplied. Both contain 1 amp fuses. Permanent connection is to be preferred to the cigar plug option.

It is common however for on-board Laptop power supplies to be fed from a cigar plug, and as the laptop will be used in conjunction with the AIS receiver it may be convenient to add a double adaptor to this source. The AIS receiver package draws very little current from your system, and it is intended that it be left on when at sea. Laptops on the other hand draw considerable current and are not normally left on at all times when ocean voyaging.

## ANTENNA

A separate marine VHF or dedicated AIS tuned antenna at a reasonable height is connected to the SO239 socket at the top of the radio. DO NOT mount the antenna adjacent to your existing VHF antenna, and keep it as far as practicable from an SSB backstay or whip. As with other aerials, eg GPS, try to avoid mounting close to and in the path of your Radar beam.

On a yacht this can be difficult, so bear in mind there may be occasions whilst you are transmitting SSB on certain frequencies that the signal breaks through to the AIS receiver, and triggers the alarm. To mitigate, ensure that all antenna connections and coaxial cable are in good condition, and that your antenna tuner is doing what it is supposed to.

Within reason, the higher the antenna the better, bearing in mind the signal losses associated with very long runs of the common RG58 type of coaxial cable from antenna to radio. For cable runs of 12 meters or more RG213 or RG8 cable will cause much less loss.

A reasonable compromise between desirable height and signal loss and/or mounting difficulty would be a radar arch or lower spreader mounting.

If you have installed a conventional marine VHF aerial, it can serve as an emergency VHF Radio aerial, simply by unscrewing the lead from the aisALERT and attaching to the VHF Radio.

## ANTENNA (cont'd)

If the vessel has a VHF antenna already fitted at the masthead, and no alternative position for a separate antenna is available or desirable, a splitter, part number CEANTSPL, is available. This shares the existing antenna with both radios. A slight loss of signal strength is incurred on both radios, but in the case of the AIS receiver this solution will still result in longer distance reception than an antenna mounted much lower. The degradation of the VHF voice radio signal has shown to be noticeable only at very marginal communication distances. It is important to note that a splitter may compromise the reliability of your VHF, and this could be a safety issue.

In tests the AIS signal has been received consistently on the Pacific 1/2 wave antenna (length 1m) from ships at distances of 10 miles, with the yacht antenna base at a height of 3 meters.

Do not be tempted to use a high gain antenna for shipboard use unless you can be sure it has close to an omni-directional (360 degree) reception pattern. Most high gain antennas achieve their 'gain' by concentrating their 'beam' into restricted arcs. This is most undesirable in an AIS reception situation.

## LAPTOP/RADIO

Plug the 3.5mm stereo plug with the single exiting cable into the MIC socket on the Laptop. Many laptops will have 3 sockets: Line-in, Mic-in and Speaker out. Often the Mic-in socket will have a pink surrounding bezel. All will have small icons or pictures denoting which socket is which. Take care to select the correct socket.

The other end of the laptop cable plugs into the TOP socket on the right hand side of the radio. Make sure the plug is firmly inserted.

The short lead with a 2.5mm mono plug is inserted into the matching socket on the top of the cradle.

## EXTERNAL BUZZER

The optional external buzzer is not waterproof.

One end of this cable has no terminals, to facilitate feeding it from the radio cradle back to the chosen location.

Take care to connect the two wires correctly to the terminal strip. Do not short them together.

After connection, plug the cable into the 3.5mm socket on the right hand side of the cradle.

With the external buzzer plugged in the internal unit is disabled. The LED will continue to operate.

# GPS & SHIPLOTTER (SP) INSTALLATION

**Before installing and running ShipPlotter (SP) it is preferable to install any hardware needed for the GPS input.**

If you already run CMap, Maxsea or some other charting software you will have arranged for a GPS to be attached to one of your laptop ports.

The type of ports and hubs in use varies widely, but a common approach with the modern USB only laptop is to run a USB/SERIAL converter from one of the USB ports, or via a USB hub, and plug the GPS into that.

This port **cannot** be simultaneously used for SP. If you are happy to run only one of the programs at any time, then you do not need another port, but that is not a very satisfactory method.

To use the same GPS for two simultaneously running programs you need to install the supplied USB/Serial converter and Y cable.

## **MAKE SURE THE GPS IS TURNED OFF**

**Before you install the new hardware go to:**

CONTROL PANEL/PERFORMANCE and MAINTENANCE/SYSTEM/(your path may be just Control Panel/System)/HARDWARE/DEVICE MANAGER/PORTS.

Click on the + sign and a list of all your ports will show. **Make a note of the numbers e.g. com2, com3.**

Exit from this and go back to the computer wakeup screen.

**Insert the Resource Disc and Open the Files.** The disc contains the ShipPlotter program, back-up manuals, some in-depth articles relating to AIS, maps and the USB Serial Converter Driver.

Double left click on the folder USB Serial Converter Driver, and then click once on SETUP.EXE.

The Install Shield Wizard box will open. Click on NEXT.

Wait until the Install Shield Wizard Complete box appears, and click on FINISH.

Close the window.

Now plug the **new** USB/Serial Converter into a **spare** USB port that you wish it to be always attached to, **not the one your existing GPS/Converter is normally plugged into.**

Windows will 'find the new hardware' and after a moment tell you it is now installed and working.

Then go to back to the DEVICE MANAGER, following the path as set out above, and you will see the new extra port. **Make a note of its Com Port Number. You will need to enter the port number later into ShipPlotter.**

Double click on the new Port then click PORT SETTINGS. Change the settings to read 4800, 8, none, 1, none, then click OK.

Remove the existing ship GPS lead from the original existing Serial Converter.

Fit the new serial Y cable to the existing GPS cable, and then plug the existing and new USB/SERIAL converters into the Y cable.

Now you can move on to loading and configuring SP for the new GPS port.

## **LOADING SHIPLOTTER.**

From the Disc, double left click on JUMPING MOUSE.reg. When asked if you want to enter it into the Registry click YES.

Click on the ShipPlotter.exe icon, click on RUN, then "I accept the agreement", then NEXT. DO NOT change the default folder locations. Click on NEXT and continue to click on NEXT until the INSTALL option is given. Click on INSTALL, then FINISH.

## **DO A RESTART OF YOUR COMPUTER.**

OPEN SHIPLOTTER by clicking on the new desktop Icon. You will see a registration dialogue. Ignore this and carry on. You will be contacted by Cruising Electronics re the Registration. Have a brief read through the help file.

The following settings will provide a good starting point. After some experience, and a more in-depth study of the Help file, you may wish to tailor the program to suit your preferences eg ship plotting colours, alert zones etc. The Help file will always have the latest information for your version of SP.

**OPTIONS** box has the following settings

**DEMODULATOR.** Check AUTOBIAS, then OK. Leave the top two boxes ticked.

**RADAR.** Check HEAD UP, then OK

**IMPORTANT. IF YOUR VESSEL IS STATIONARY THE GPS COURSE READING (AS BEING INTERPRETED BY SHIPLOTTER) WILL LIKELY BE CONSTANTLY CHANGING. THIS WILL RESULT IN THE RELATIVE BEARINGS OF SP TARGETS CONSTANTLY CHANGING. TO REMEDY, CHANGE THE RADAR SETTING TO NORTH UP, BUT REMEMBER TO SET TO HEAD UP ONCE ON A VOYAGE.**

**I/O.** Check ENABLE AUDIO PROCESSING. Check NMEA1 and enter the NEW PORT number (obtained prior from DEVICE MANAGER), then OK. The Rate should be 4800. Ignore all other check boxes.

**MY SHIP.** Enter your Vessel name, type of vessel (normally vessel-sailing), and the Measurements.

The four dimensions allow the vessel to be plotted at the correct size if the chart scale is sufficient. The dimension are the length overall, the width overall, the length forward of the GPS receiving antenna, the width to port of the GPS receiving antenna. The length overall must be greater than the length forward of the antenna and the width overall must be greater than the width to port of the antenna.

The DESTINATION and ETA fields can be left empty. The default MMSI number is 999999999. Check OK.

**AUDIO/AUDIO MIXER.** Select the MICROPHONE i/p and move the slider up to the 3rd mark. If your software doesn't show the Audio Mixer option please refer to the separate instruction re adjusting the sound card (audio) input.



**SPANNER** icon in the main toolbar allows you to customise the manner in which target vessels are displayed.

Suggested settings are:

<b>PREDICTED TRACK and WAKE HISTORY</b>	- 30 minutes, colours RED and CYAN.
<b>GREY SHIPS AFTER</b>	- 60 minutes
<b>OMIT SHIPS AFTER</b>	- 100 minutes
<b>OMIT SHIPS BELOW</b>	- 0 Knots (This will still display moored ships)
<b>OMIT SHIPS BEYOND</b>	- 50 nm
<b>SCRAP SHIPS AFTER</b>	- 2 hours
<b>PREDICT POSITION</b>	Deselect
<b>ROT</b>	Select
<b>LEAVE A PERMANENT TRAIL</b>	Deselect

### **RANGE RINGS**

Select GPS CENTERED: ENTER RADIUS SETTINGS MIN 1, STEP2, MAX. 15

COLOUR	Select Cyan
HOME LAT	Not required unless using as a base station
HOME LONG	As above

<b>SHIP PLOTTING BY STATUS</b>	Deselect BY TYPE
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When the cursor is highlighting UNDER WAY, by clicking on the COLOUR name box the colour in which that status is displayed can be changed.

Go through **each** STATUS type, deselect the BY TYPE box, and set the COLOUR to suit.

Suggested colours are	For any vessel actually moving, RED
	For any vessel moored, anchored, YELLOW

<b>SHIP PLOTTING BY TYPE</b>	Click on SELECT ALL, then ensure PLOTTED and LABELLED are showing
	Deselect MMSI
	Select MANUAL

### **CHART CENTRING**

<b>AUDIBLE ALERT</b>	Set to 0nm of ref pos.
	Deselect THAT IS NEW TO US
	Deselect WITHIN THE CURRENT ALERTZONE

<b>SHIP LABELS</b>	Click on the upper COLOUR box. In the new window set Local Ship to Cyan, Designated Ship to Green. Check Circle Designated Ship, Reg, and ISO
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<b>ANTI ALIASING PLOTTER</b>	Deselect
<b>SCALE LINE</b>	Select
<b>SCALE LINE COLOUR</b>	Cyan

Click on OK to close.

**Left click on the Speaker Icon in the computer taskbar and tick the MUTE box.**

<http://groups.yahoo.com/group/shipplotter> The ShipPlotter user group, although quite heavily influenced by land-based ship spotting folk, is a very useful information source.

## OPERATION

It is strongly recommended that you read the AIS OVERVIEW and ShipPlotter help files first, in order to understand the principles of AIS, the limitations, and the factors affecting reception and plotting.

There is no on-off switch on the alarm unit itself.

The On/Off/Volume knob on the top of the RADIO is fixed. Do NOT attempt to turn it.

Once the installation has been completed, and the boat power circuit turned on, the unit will be on. This is indicated in the first instance by the blue dial backlight of the Radio display being illuminated.

**PRESS THE F KEY THEN THE SCN (3) KEY. THIS IS IMPORTANT.**

**The unit should now scan between the two AIS frequencies, channels 87B and 88B.**

**This procedure MUST be followed again if the radio is turned off.**

The ALARM function has two modes, controlled by the toggle switch situated on the cradle at the rear of the radio.

In either mode the Radio dial light will be ON.

**MODE 1** Audible alarm ON - the rear toggle switch will be to the right (rear view).

The blue LED on the front of the cradle will be illuminated.

Upon the radio receiving a signal this LED will illuminate at a brighter level and the buzzer will sound for approx. 3 seconds.

If the optional external buzzer is connected it will sound, but the cradle buzzer will NOT.

**MODE 2** Audible alarm OFF - the rear toggle switch will be to the left (rear view).

The blue LED on the front of the cradle will be off.

Upon the radio receiving a signal this LED will illuminate for approx. 3 seconds.

The alarm will NOT sound.

If the optional external buzzer is connected it will NOT sound.

If the alarm is activated in either mode it is very likely an AIS station is transmitting within your vicinity. The possibility exists that the alarm was activated by extraneous noise on the channel but this is very unlikely, particularly in open ocean areas.

To confirm and to identify, locate and track the ship(s), turn on the laptop and open ShipPlotter (SP).

**It is assumed you have set up SP as outlined earlier.**

Full operation is given in the supplied ShipPlotter Manual, but because the program is continually being improved, the latest instructions for your version will always be found in the program's Help File.

To begin processing, click on the Green Start Button near the upper left corner of the screen.

If ships are within range you will soon see targets appearing on-screen. Remember, the vessel name is transmitted less often, so at first you may just see the Reg. Number.

To obtain more information re any target, RIGHT click on it. A pop-up window will appear, containing any more information received to date from the vessel.

A target can be 'designated' by double LEFT clicking on it.

This will place a green circle around the target, and text relating to it will appear along the bottom of the SP window.

To 'un-designate' a target, double LEFT click on it again.

## MANUAL SOUND CARD SETTINGS

If the AUDIO MIXER is not available in ShipPlotter it will be necessary to manually adjust the sound card settings.

### **If your laptop shows a small speaker icon in the taskbar follow this procedure:**

Right click on the SPEAKER icon.

Left click on OPEN VOLUME CONTROL.

Put a check in the MUTE ALL or MICROPHONE MUTE box.

Left click on OPTIONS.

Left click on PROPERTIES.

Select RECORDING click OK.

Select MICROPHONE and set the SLIDER between the 3rd and 4th marks.

Close the window.

**If your laptop does not show a speaker icon in the taskbar** hover the cursor over the arrow key there: it will tell you it is hiding inactive Icons. Click on the arrow to see if the speaker icon is indeed there.

### **If the icon is not present at all, follow this procedure:**

Go to START/SETTINGS/CONTROL PANEL (or START/CONTROL PANEL), SOUNDS AND AUDIO DEVICES.

Tick the box called PLACE VOLUME ICON IN THE TASKBAR if such a box exists. You could now follow the procedure above.

### **If not carry on and do the following:**

In the DEVICE VOLUME area click on ADVANCED.

Place a tick in the MUTE ALL or MICROPHONE MUTE Box.

Click on OPTIONS then PROPERTIES then RECORDING.

Ensure that the MICROPHONE box has a tick in it. Click OK.

Close down the other windows.

## SPECIFICATIONS

### RADIO

FM Dual Conversion 2Ch. Scanning.

FREQUENCY	161.975 (CH87B) and 162.025 (CH88B) MHz
SENSITIVITY	.16 $\mu$ V 12db Sinad
ADJACENT CHANNEL SELECTIVITY	70db
FREQUENCY STABILITY	+/- 2.5 ppm
DEVIATION	+/- 5 KHz
OUTPUT	Discriminator Audio
ANTENNA IMPEDANCE	50 Ohms
OPERATING CURRENT	55mA
SUPPLY VOLTAGE	11-15 vdc
WEIGHT	Approx.250gms
CONSTRUCTION	ABS with Diecast Chassis
COUNTRY OF MANUFACTURE	China

### ALARM CRADLE

Cmos/Bipolar Circuitry

AUDIO OUTPUT	85db @ 10cm
AUDIO FREQUENCY	4400Hz +/- 500Hz
AUDIO MODE CURRENT-S/BY -Activated	10mA 50mA
SILENT MODE CURRENT-S/BY -Activated	5mA 45mA
SUPPLY VOLTAGE	11-15 vdc
COUNTRY OF MANUFACTURE	NZ

## PACKING LIST

Radio C/W Cradle

Power Lead 1M Cigar Plug with integral Fuse and 2.1mm Plug

Power Lead 1.7M Open Lead with Fuseholder and 2.1mm Plug

Data/Audio Lead 1.8M Radio to Cradle and Laptop

USB/Serial Converter (not in all versions)

Serial Y Cable (not in all versions)

Radio Operation Manual

ShipPlotter Manual

Resource CD

230vac to 12vdc Converter (not in all versions)

### DISCLAIMER

*If you carry ShipPlotter on board any vessel, you must understand that, while ShipPlotter may provide you with some potentially useful information about some of the ships in your vicinity, COAA does not make any warranties whatsoever that ShipPlotter is fit or appropriate for any application, including but not limited to, applications where the safety of life is at stake.*

*On the contrary, your primary means of navigation, collision avoidance and seamanship in general must place no reliance whatsoever on ShipPlotter or any of the data that it generates. Not all vessels carry AIS equipment; not all vessels that carry it can be relied upon to have it operational; the radio receiver to which ShipPlotter is connected may not be delivering all messages in a decodable form; ShipPlotter may not decode messages correctly; ShipPlotter code is reliability tested to an extent that is adequate for entertainment and educational use but is neither warranted nor tested for any operational use.*

## WARRANTY

*A warranty of 12 months from date of purchase shall apply.*

*Cruising Electronics will either  
(at it's sole discretion)*

*Repair, Replace or Refund should any defect arise resulting from faulty manufacture.*

*The Warranty does not cover failure or damage caused by faulty installation, misuse, exposure to liquids or other harmful substances.*

*Proof of purchase will be required*

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## NOTES