DIGITAL YACHT

SAIL BOAT   SPORT FISHING   MOTOR BOAT

ⓘ **IMPORTANT NOTE**

The USB cable of the AIT1500/2000/3000 is designed to be used for configuring/programming the unit during installation and not for permanent connection to the boat's Navigation PC.

If you intend to permanently connect your Class B Transponder to a PC or MAC via a USB interface, we recommend that you use our NMEA to USB adaptor cable which will protect the unit from voltage differences, noise and electrical spikes that can occur in marine installations.

AIT1500/2000/3000 CLASS B AIS TRANSPONDERS

Installation and instruction Manual

PRODUCT HANDBOOK

Table of Contents

1.   Notices

When reading this manual please pay attention to warnings marked with the warning triangle shown on the left. These are important messages for safety, installation and usage of the product.

This manual is applicable to all of the current generation of Digital Yacht Class B Transponders including the AIT1500, AIT2000 and AIT3000. All units share the exact same Class B AIS transponder design and in terms of RF performance are identical.

1.1   Safety Warnings

This equipment must be installed in accordance with the instructions provided in this manual. DO NOT install the equipment in a flammable atmosphere such as in an engine room or near to fuel tanks.

The Digital Yacht CLASS B TRANSPONDER is an aid to navigation and must not be relied upon to provide accurate navigation information. AIS is not a replacement for vigilant human lookouts and other navigation aids such as Radar. The performance of the CLASS B TRANSPONDER may be seriously impaired if not installed as instructed in the user manual, or due to other factors such as weather and or nearby transmitting devices. Compatibility with other systems is reliant on third party systems recognising the standard outputs from the CLASS B TRANSPONDER. Digital Yacht reserves the right to update and change these specifications at any time and without notice.

1.2   Position source

All marine Automatic Identification System (AIS) transponders utilise a satellite based location system such as the Global Positioning Satellite (GPS) network. The accuracy of a GPS position fix is variable and is affected by factors such as the antenna positioning, how many satellites are used to determine a position and how long satellite information has been received for.

1.3   Compass safe distance

The compass safe distance of this unit is 0.5m or greater for 0.3° deviation.   We suggest you always mount the unit 1m away from any compass and check for any localised interference

1.4   RF emissions notice

Caution: The AIS transponder generates and radiates radio frequency electromagnetic energy. This equipment must be installed and operated according to the instructions contained in this manual. Failure to do so can result in personal injury and / or AIS transponder malfunction. Caution: Never operate the AIS transponder unless it is connected to a VHF antenna.

To maximise performance and minimise human exposure to radio frequency electromagnetic energy you must make sure that the antenna is mounted at least 1.5 metres away from the AIS transponder and is connected to the AIS transponder before power is applied. The system has a Maximum Permissible Exposure (MPE) radius of 1.5m. This has been determined assuming the maximum power of the AIS transponder and using antennas with a maximum gain of 3dBi.The antenna should be mounted 3.5m above the deck in order to meet RF exposure requirements. Higher gain antennas will require a greater MPE radius. Do not operate the unit when anyone is within the MPE radius of the antenna (unless they are shielded from the antenna field by a grounded metallic barrier). The antenna should not be co-located or

operated in conjunction with any other transmitting antenna. The required antenna impedance is 50 Ohms.

1.5   Warranty

The CLASS B TRANSPONDER is supplied with a standard 2 year return to base warranty as defined in the accompanying warranty information. Any attempt to tamper with or damage this product will invalidate the warranty. Physical damage and damage caused by salt water ingress are not covered under this warranty.

1.6   Disposal of this product and packaging

Please dispose of the AIS transponder in accordance with the European WEEE Directive or with the applicable local regulations for disposal of electrical equipment.   Every effort has been made to ensure the packaging for this product is recyclable. Please dispose of the packaging in an environmentally friendly manner.

1.7   Accuracy of this manual

The AIS transponder may be upgraded from time to time and future versions of the AIS transponder may therefore not correspond exactly with this manual. Information contained in this manual is liable to change without notice. The manufacturer of this product disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

1.8   Declaration of conformity

Digital Yacht declare that this product is in compliance with the essential requirements and other provisions of the R&TTE directive 1995/5/EC.

The product carries the CE mark, notified body number and alert symbol as required by the R&TTE directive.

The CLASS B TRANSPONDER is intended for sale in the following member states: United Kingdom, France, Spain, Sweden, Austria, Netherlands, Portugal, Denmark, Norway, Belgium, Italy, Finland, Ireland, Luxembourg, Germany and Czech Rep.

1.9   FCC notice

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

⚠ WARNING: This device must be programmed with data pertaining to the vessel, on which the device is or will be installed, by a qualified dealer or installer. Instructions for verifying correct programming can be found in the manual.

⚠ WARNING: It is a violation of the rules of the Federal Communications Commission to input an MMSI that has not been properly assigned to the end user, or to otherwise input any inaccurate data in this device.

The following information about these transponders is required to complete license applications:

- FCC ID 07D-ZDIGAIT2000
- FCC Type Accepted Parts 15 and 80
- Ouput Power: 2 watts
- Modulation: GMSK
- Frequency Range: 156.025 MHz to 162.025 MHz

In addition, the AIT3000 unit: CONTAINS FCC ID U30-G2M5477

1.10   Industry Canada notice

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1.   This device may not cause interference, and

2.   This device must accept any interference, including interference that may cause undesired operation of the device.

This Class B digital apparatus complies with Canadian ICES-003.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1.   L'appareil ne doit pas produire de brouillage, et

2.   L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le Fonctionnement.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

2.   About Your AIS Class B Transponder

2.1   About AIS

The marine Automatic Identification System (AIS) is a location and vessel information reporting system. It allows vessels equipped with AIS to automatically and dynamically share and regularly update their position, speed, course and other information such as vessel identity with similarly equipped vessels. Position is derived from the Global Positioning System (GPS) and communication between vessels is by Very High Frequency (VHF) digital transmissions.

There are a number of types of AIS device as follows:

Class A transponders

These are similar to class B transponders, but are designed to be fitted to large vessels such as cargo ships and large passenger vessels. Class A transponders transmit at a higher VHF signal power than class B transponders and therefore can be received by more distant vessels. They also transmit Class A transponders are mandatory on all vessels over 300 gross tonnes on international voyages and certain types of passenger vessels under SOLAS regulations.

Class B transponders

Similar to class A transponders in many ways, but are normally lower cost due to the less stringent performance requirements. Class B transponders transmit at a lower power and at a lower reporting rate than class A transponders.

AIS base stations

AIS base stations are used by Vessel Traffic Systems to monitor and control the transmissions of AIS transponders.

Aids to Navigation (AtoN) transponders

AtoNs are transponders mounted on buoys or other hazards to shipping which transmit details of their location to the surrounding vessels.

AIS receivers

AIS receivers will generally receive transmissions from class A transponders, class B transponders, AtoNs and AIS base stations but do not transmit any information about the vessel on which they are installed.

This product is an AIS Class B transponder.

2.2   Static and dynamic vessel data

There are two categories of information transmitted by an AIS transponder: static and dynamic data.

The vessel's dynamic data, which includes location, speed over ground (SOG) and course over ground (COG), is calculated automatically using the internal GPS receiver.

Static data is information about the vessel which must be programmed into the AIS transponder. This includes:

- Maritime Mobile Service Identity (MMSI)
- Vessel name
- Vessel call sign (if available)
- Vessel type
- Vessel dimensions

In most countries the operation of an AIS transponder is included under the vessel's marine VHF licence provisions. The vessel on to which the AIS unit is to be installed must therefore possess a current VHF radiotelephone licence which lists the AIS system, vessel Call Sign and MMSI number.

⚠ An MMSI number is required in order for the AIS transceiver to operate. Please contact the relevant authority in your country for more information.

2.3 Important information for US customers

There are specific laws in the USA regarding the configuration of AIS class B transponders.

If you are a US resident and intend to use your AIS class B transponder in US waters, you should make sure that your retailer has configured your product prior to supplying it to you. If your AIS transponder has not been pre-configured please contact your dealer for details of how to have it configured.

3   What's In The Box ?

These items are included with your AIS transponder purchase.

- ***CLASS B TRANSPONDER (with integrated connections for power, NMEA and USB)***
- ***GPS ANTENNA(except AIT1500 which has an internal GPS antenna)***
- ***QUICK START GUIDE***
- ***DIGITAL YACHT SOFTWARE AND DRIVER CD***

The following sections give a brief overview of each item. Please ensure all items are present and if any of the items are not present contact your dealer.

3.1   Digital Yacht Software and Driver CD

The CD supplied with the package contains the following:

- proAIS2 software tool necessary to configure the AIS transponder. Two versions of the program are on the CD, one for PCs running Windows and one for Macs running OSX (Intel only). Please refer to section 6 for details of the configuration process and how to use the proAIS2 tool.

  NOTE - products supplied in the USA will be pre-programmed by a dealer or competent authority.

- USB drivers required by PCs and/or Macs so that they know how to talk to the AIS transponder. The drivers are automatically installed during the proAIS2 installation process.
- Alternative language versions of this manual.
- A complete set of manuals for all Digital Yacht Products
- All of the latest Tech Support Notes, that provide additional installation and support information of all Digital Yacht products
- SmarterTrack Lite AIS Viewing Software which is a simple AIS display program for using with your AIS Transponder on a Windows PC
- Other useful programs and utilities

3.2   GPS Antenna

The AIT2000/3000 transponders require an external GPS antenna (as supplied). The supplied GPS antenna is designed to be fitted to a standard 1"x14 TPI threaded VHF pole mount, which are available in many different styles from all good marine electronic dealers and chandleries.

It is possible to use any existing GPS antenna as long as it is a passive GPS type antenna with a 3v or 5v pre-amplifier. It is not possible to connect another GPS unit to the CLASS B TRANSPONDER via NMEA. The international Class B Transponder specification states that a transponder must have its own GPS to ensure that it can work entirely on its own without being reliant upon other external equipment.

The GPS antenna supplied with the Class B Transponder comes complete with 10m of cable and is terminated in a TNC connector. The cable can be lengthened but this should be done using a suitable TNC (Male) to TNC (Female) extension cable or carried out by an experienced and qualified Marine Electronics Dealer. Any joins in the cable should be made to a professional standard suitable for the marine environment.

The AIT1500 has a built-in GPS antenna which is designed to give good GPS reception even when mounted down below. The antenna is located in the top of the unit and it is important that the AIT1500 is mounted vertically with just a layer of fibre-glass above the unit, no metallic or electrical objects.

3.3   Power/Data and USB Cables

The integral 1 metre Power and Data cable allows power, NMEA 0183 data and an optional "Silent Switch" to be connected to the CLASS B TRANSPONDER transponder. This twelve core cable can be extended using suitable marine grade cables . To aid installation, a table of the wire connections and colours, is printed on the CLASS B TRANSPONDER product label.

The integral 1 metre USB cable allows a power and data connection between the CLASS B TRANSPONDER and a computer. The CLASS B TRANSPONDER will take enough power from the USB connection to operate as an AIS Receiver. This is useful for initial programming/configuration of the CLASS B TRANSPONDER with your MMSI number and other vessel data, which can be done at home or in the office without the need of an additional 12v DC supply. It should be noted that the CLASS B TRANSPONDER will not operate as a Transponder without an external power supply connected to the Red and Black Wires of the Power/Data cable.

3.4   Electrical Connections

Our Class B Transponders have the following electrical connections:

- Power supply 12v or 24v
- Two NMEA0183 data ports for connection to chart plotters and other NMEA0183 compatible equipment
- USB for connection to a PC or Mac
- External switch input for silent mode control (on power/data cable)
- NMEA2000 port for connection to NMEA2000 compatible equipment (Only AIT2000+AIT3000)
- In addition there are two other connections for the VHF antenna and the external GPS antenna.

Figure 1 shows the electrical connections to the Power/Data cable that is common to all three models of our Class B Transponder.

It is good etiquette to fit a "Silence Switch" to a Class B transponder and to only transmit your position in poor weather or when crossing busy shipping lanes/areas.

The transponder will operate on "Silent Mode" when the Blue and White wires of the Power/Data cable are connected together. In "Silent Mode" the transponder continues to receive other AIS targets, but it does not transmit its own position to other vessels.

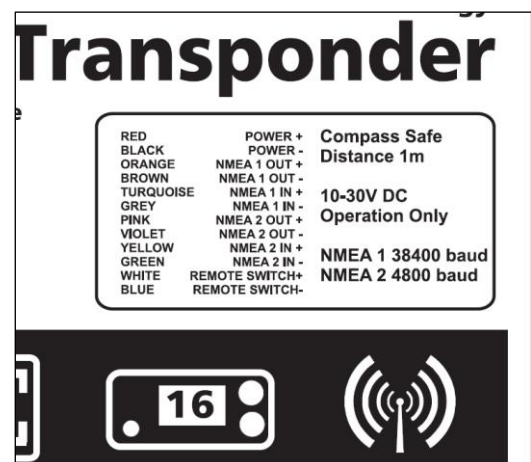|		Compass Safe Distance 1m
RED	POWER +	
BLACK	POWER -	
ORANGE	NMEA 1 OUT +	
BROWN	NMEA 1 OUT -	10-30V DC
TURQUOISE	NMEA 1 IN +	Operation Only
GREY	NMEA 1 IN -	
PINK	NMEA 2 OUT +	
VIOLET	NMEA 2 OUT -	
YELLOW	NMEA 2 IN +	NMEA 1 38400 baud
GREEN	NMEA 2 IN -	NMEA 2 4800 baud
WHITE	REMOTE SWITCH+	
BLUE	REMOTE SWITCH-	

Figure 1

4.   Installation

4.1   Preparing for Installation

Figure 2 below shows a typical installation of an CLASS B TRANSPONDER. Please take the time to familiarise yourself with the system elements and their connections prior to attempting installation.
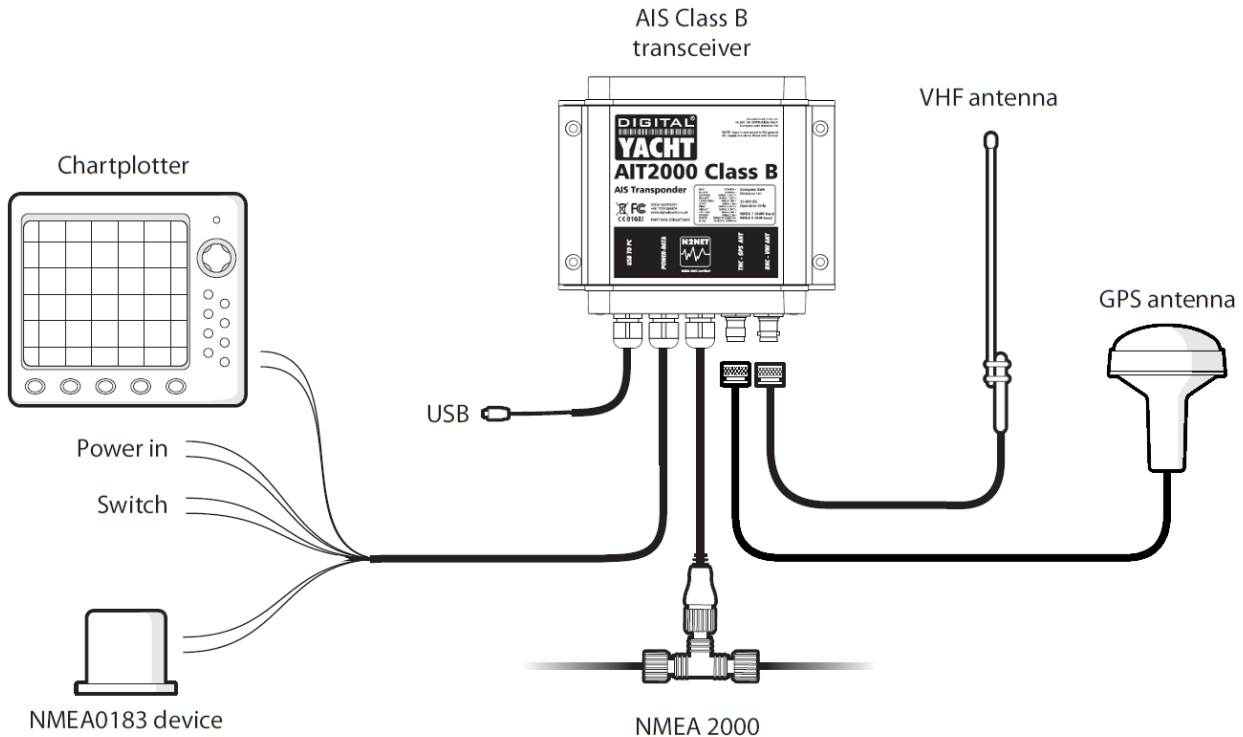

Figure 2

In addition to the items provided with your AIS transponder the following items will be required for installation:

- VHF antenna or a suitable Class B Transponder Splitter if you intend to use your existing VHF antenna (our AIT3000 has its own built-in splitter).
- Four M4 screws or other fixings for the CLASS B TRANSPONDER appropriate to the mounting location
- A suitable 1"x14TPI thread mount for the GPS Antenna (not supplied)

Connection to a suitable VHF antenna will be required for the AIS transponder to operate. A standard marine band VHF antenna can be used, however, many manufacturers are now offering AIS tuned (162MHz) antennas that offer even better performance.

⚠ Alternatively, if you wish to use the vessel's existing VHF antenna, our SPL2000 antenna splitter product is available which allows the existing antenna to be used by the VHF voice radio and the Class B Transponder.

Below is a typical splitter installation diagram showing how our AIT2000 (or AIT1500) and SPL2000 Splitter should be connected to the vessel's existing VHF antenna.
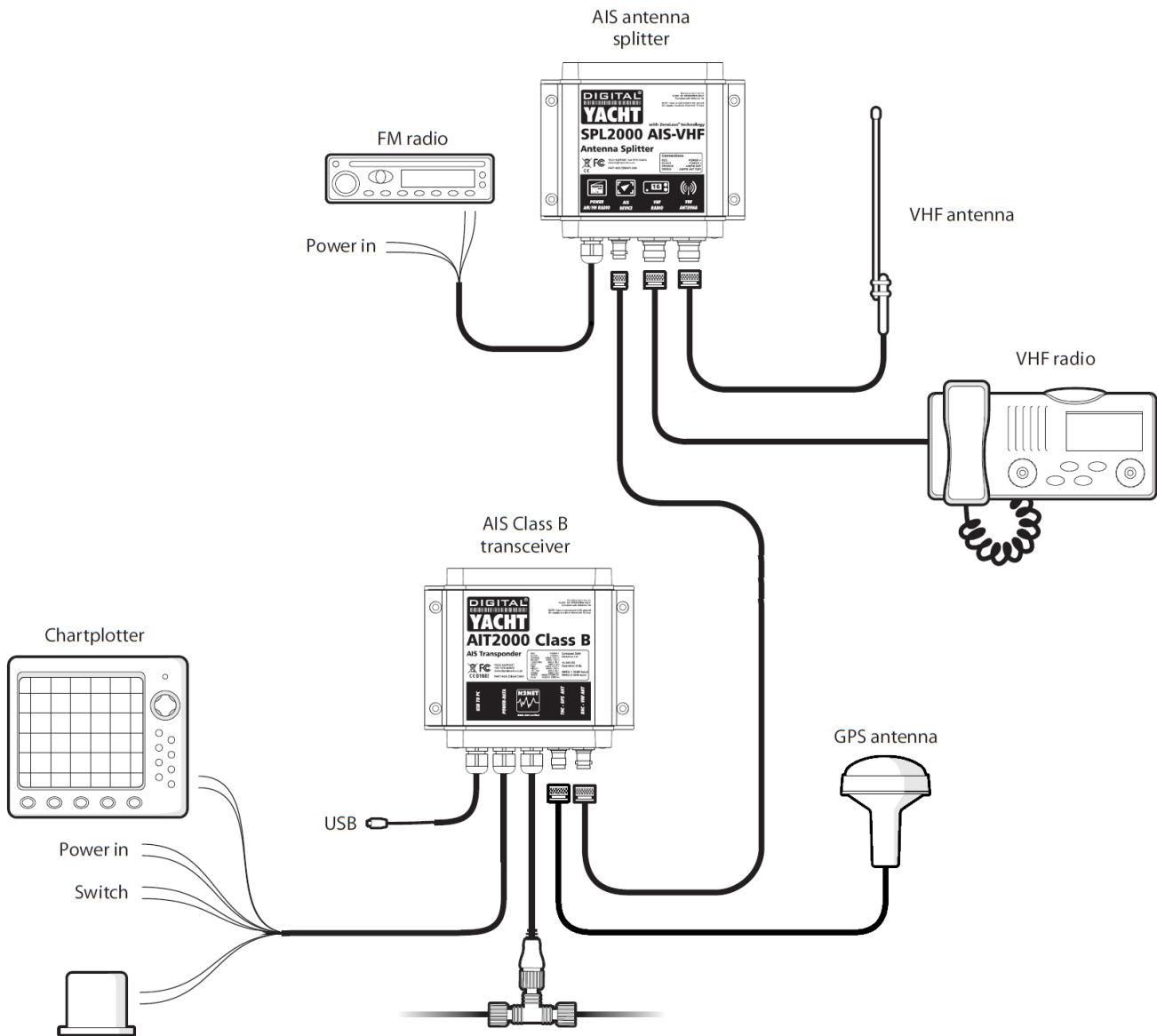

Figure 3

4.2   Optional "Silent" switch

A switch can be connected to the transponder to enable and disable 'silent mode'. A standard "Single Pole Single Throw" (SPST) toggle switch is required to use this feature. When the switch is "closed" the Class B Transponder stops transmitting ("Silent Mode") and when the switch is "open" the Class B Transponder starts transmitting again.

4.3   VHF antenna cable

Please check that the VHF antenna you intend to use has sufficient cable to reach between the VHF antenna and the AIS transponder unit. If it is not sufficient you will need an extension cable. Please contact your dealer for details of suitable products. For reference the VHF antenna connector type on the AIS transponder unit is BNC female, and is intended to mate with a BNC male connector.

All VHF antenna cables should be 50ohm coax (such as RG58) and 75ohm TV antenna coax cable should not be used. VHF antenna cable runs should be kept as short as possible to avoid unwanted signal attenuation and loading problems.

4.4   Power and data cable

The AIS transponder unit is supplied with a 1m long power and data cable integrated into the unit. If you require longer cables to reach your power supply, please ensure the cables are capable of carrying currents of up to 2A peak and 0.5A average. Means of connecting the cables together will also be required. The use of Scotchlok type connectors is recommended for this purpose.

4.5   Chart plotter

To display received AIS messages as other vessels on your chart plotter, you will need to connect your AIS transponder to your chart plotter. This is usually done via NMEA 0183 or via NMEA 2000, which are the marine industry standards for digital communication.

Please refer to the user manual supplied with your chart plotter for details of how to connect and configure your chart plotter for use with AIS devices. For NMEA 0183 data connections, your chart plotter should be configured to accept NMEA data at 38400 baud (sometimes referred to as 'NMEA HS' in the plotter configuration menu). You may also need to enable the display of AIS targets in the chart options.

Alternatively if you use an NMEA2000 network on your vessel it is possible to connect the AIS transponder (except the AIT1500) to the NMEA2000 network via the integral cable. Assuming that you are connecting to an existing NMEA2000 network, you should be able to simply "plug and play" the Class B Transponder in to a spare "T-piece" connector on the network.

Please refer to your dealer and to the chart plotter manual for more information on NMEA2000 networking.

4.6   Connection to a PC or Mac

If you choose to use a PC or Mac with suitable charting software to display received AIS messages as other vessels, this can be accomplished by connecting the USB cable integrated into the unit.

For permanent USB connection to a PC or Mac, we strongly recommend the use of one of our NMEA to USB Adaptor cables. The USB cable that comes with the Class B Transponders is connected directly to the micro-processor for configuration and programming purposes. It does not have galvanic isolation or protection against static and voltage spikes that can often happen on boats, particularly blue water yachts travelling in hot or tropical locations.

5. Installation Procedure

It is strongly recommended that you read all of the instructions in this manual prior to installation.

If after reading this manual you are unsure about any element of the installation process please contact your dealer for advice.

The following sections explain the installation process step by step for each of the main elements of the system.

5.1 Installing the AIS transponder

Please note the following guidelines when selecting a location for your AIS transponder:

- The AIS transponder must be fitted in a location where it is at least 0.5m from a compass or any magnetic device.
- There should be adequate space around the AIS transponder for routing of cables. See drawing below for details of the AIS transponder dimensions.
- The ambient temperature around the AIS transponder should be maintained between -25°C and +55°C.
- The AIS transponder should not be located in a flammable or hazardous atmosphere such as in an engine room or near to fuel tanks.
- The AIS transponder is fully waterproof to ingress protection rating IPx5, however it is recommended that the AIS transponder is not subjected to extended periods of exposure to spray or submersion.
- It is recommended that the AIS transponder is installed in a 'below decks' environment.
- It is acceptable to mount the AIT2000 and AIT3000 either vertically or horizontallym BUT the AIT1500 must be mounted vertically with only fibreglass directly above the unit.
- To mount the AIT2000 and AIT3000 units, remove the green décor strips to expose 4 mounting holes to screw the unit to a suitable bulkhead or surface.
- The AIS transponder should be mounted in a location where the indicators are readily visible as these provide important information on the status of the AIS transponder.
- AIT1500 owners should refer to section 5.3 prior to finally fixing the unit in place.

5.2 Installing the external GPS antenna

- For mounting of the optional external GPS antenna you will require a 1" x 14 TPI thread pole, deck base or rail mount
- You should ensure the GPS antenna has a good clear view of the entire sky.
- It is not recommended that the GPS antenna is mounted up a mast where the motion of the vessel will cause the antenna to swing and potentially reduce the accuracy of the GPS position.
- Do not mount your antenna in the direct path of a radar transmitter.
- Feed the ten metre long cable attached to the GPS antenna cable through the pole and screw the antenna onto the pole mount as shown in Figure 4.

Figure 4

- Route the cable to your AIS transponder unit, adding any necessary extension cables.
- Connect the cable from the GPS antenna to the GPS connector on the AIS transponder

5.3 Installing the AIT1500 or external GPS antenna Below Deck

- The high sensitivity GPS receiver in our Class B Transponders is capable of receiving GPS position fixes even when the GPS antenna is mounted below deck. This is one of the reasons why Digital Yacht released the AIT1500 with an internal GPS antenna.
- For optimum GPS performance we would always recommend mounting the GPS antenna on deck, but many owners will get very good performance with the GPS antenna mounted below deck and benefit from a simpler, easier and cleaner installation.
- This is only possible on fibre-glass (GRP) hulled boats and care should be taken to place the AIT1500 or external GPS antenna in a location where there is just a layer of fibre-glass above the antenna, with no metallic or electrical objects above the antenna.
- The AIT1500 or external GPS antenna must be mounted vertically. The location of the GPS antenna inside the AIT1500 is shown in Fig.5
- Before finally securing the AIT1500 or GPS antenna we recommend that the GPS reception is checked using the supplied proAIS2 software for PC/Mac. Run the proAIS2 software, view the "GNSS Status" page and ensure that the GPS is receiving strong signals – all green bars with signal strength >20dBHz.

GPS Antenna

This Way Up

Figure 5

5.4 Connecting to the VHF antenna

Route the cable from the VHF antenna or splitter to the AIS transponder and connect to the VHF connector on the AIS transponder.

- A standard marine band VHF antenna or AIS antenna should be used with the AIS transponder. The connector type on the AIS transponder is a BNC. Your chosen VHF antenna requires a BNC male connector to mate with this. If your VHF antenna does not use this type of connector please contact your dealer for details of available adaptors.
- If you are using an antenna splitter, connect the AIS connection on the splitter to the VHF (BNC) connector on the Class B Transponder.
- NOTE – if you intend to use a splitter, it is important that the splitter is designed for use with a Class B Transponder. Some lower cost splitters are only designed for use with AIS receivers and will not work properly with the Class B Transponder.
- Our SPL2000 Splitter features the latest "Zero Loss" technology that lets the transponder share the main antenna with the VHF radio with none of the VHF reception loss that used to be the problem with traditional splitters.

5.5 Connecting the Power/Data cable

The integral 1m Power/Data cable allows connection of DC power, NMEA data (two inputs and two outputs) and the remote Silent Switch. The cable is terminated inside the unit and the other end of the cable has twelve colour coded bare wires ready for connection.

Table1 below lists the function of each colour coded wire for reference.

Wire colour	Description	Function
RED	Power in +	Power supply connections
BLACK	Power in -	
B**LUE**	Switch input-	External switch connection for silent mode
WHITE	Switch input+	
ORANGE	NMEA0183 port 1 TX+	High speed NMEA0183 output (38,400 baud) intended for connection to chart plotters
BROWN	NMEA0183 port 1 TX-	
TURQUOISE	NMEA0183 port 1 RX+	High speed NMEA0183 input (38,400 baud) Not normally used
GREY	NMEA0183 port 1 RX-	
PINK	NMEA0183 port 2 TX+	Low speed NMEA0183 Output (4,800baud) intended for connection to other NMEA0183 devices requiring a GPS feed. Note AIS data is not available on this output.
VIOLET	NMEA0183 port 2 TX-	
YELLOW	NMEA0183 port 2 RX+	Low speed NMEA0183 input (4,800baud) intended for connection to other NMEA0183 compatible sensors for multiplexing of data to the chart plotter
GREEN	NMEA0183 port 2 RX-	

Table 1

5.6 Connecting a "Silent" switch (optional)

A toggle switch can be connected to the AIS transponder to provide remote control of silent mode.

Connect the toggle switch between the White(+) and Blue(-) wires as shown below. Connection of an external switch to toggle silent mode is optional and not essential for normal operation of the product.
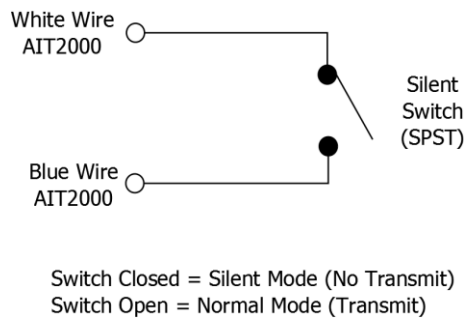
Switch Closed = Silent Mode (No Transmit)
Switch Open = Normal Mode (Transmit)

Figure 6

5.7 Connecting to NMEA0183 compatible equipment

The Class B Transponder has two independent NMEA0183 data ports which are pre-configured at the following data rates; Port 1 = 38400 baud and Port 2 = 4800 baud. Each port has a two wire Input and two wire Output, which are colour coded as shown in Table 1.

Connect the wires to the appropriate connections on your NMEA0183 compatible equipment. Please refer to your equipment manual for more information and pay particular attention to any menu settings that must be configured to configure and display AIS or other NMEA data.

The high speed NMEA Output 1 connects to a chart plotter, while the low speed NMEA Input 2 and Output 2 connect to other NMEA0183 devices. A multiplexing feature is provided, which means any messages received on the low speed Input 2 port are automatically transmitted on the high speed Output 1 port. This is particularly useful when using a chart plotter having only a single NMEA0183 port.

Instrument data or additional sensors can be connected to the AIS transponder via the low speed port. This data, plus the AIS and GPS data is transmitted on the high speed Output 1 port to the chart plotter. Please ensure your equipment is configured to use the correct baud rate for the port it is connected to.

On many vessels fitted with a modern VHF Radio that requires GPS data for the DSC functions, the low speed NMEA Output 2 can be used to give GPS data to the VHF radio. On this port are the following common NMEA 0183 GPS position sentences; GLL, GGA and RMC.

Figure 7 shows a typical installation with NMEA0183 data received on Input 1 being combined with the transponder's own AIS and GPS data and sent to the Chart Plotter on Output 1. The GPS inside the Class B Transponder provides the VHF DSC radio with GPS position data on Output 2 (4800 baud).
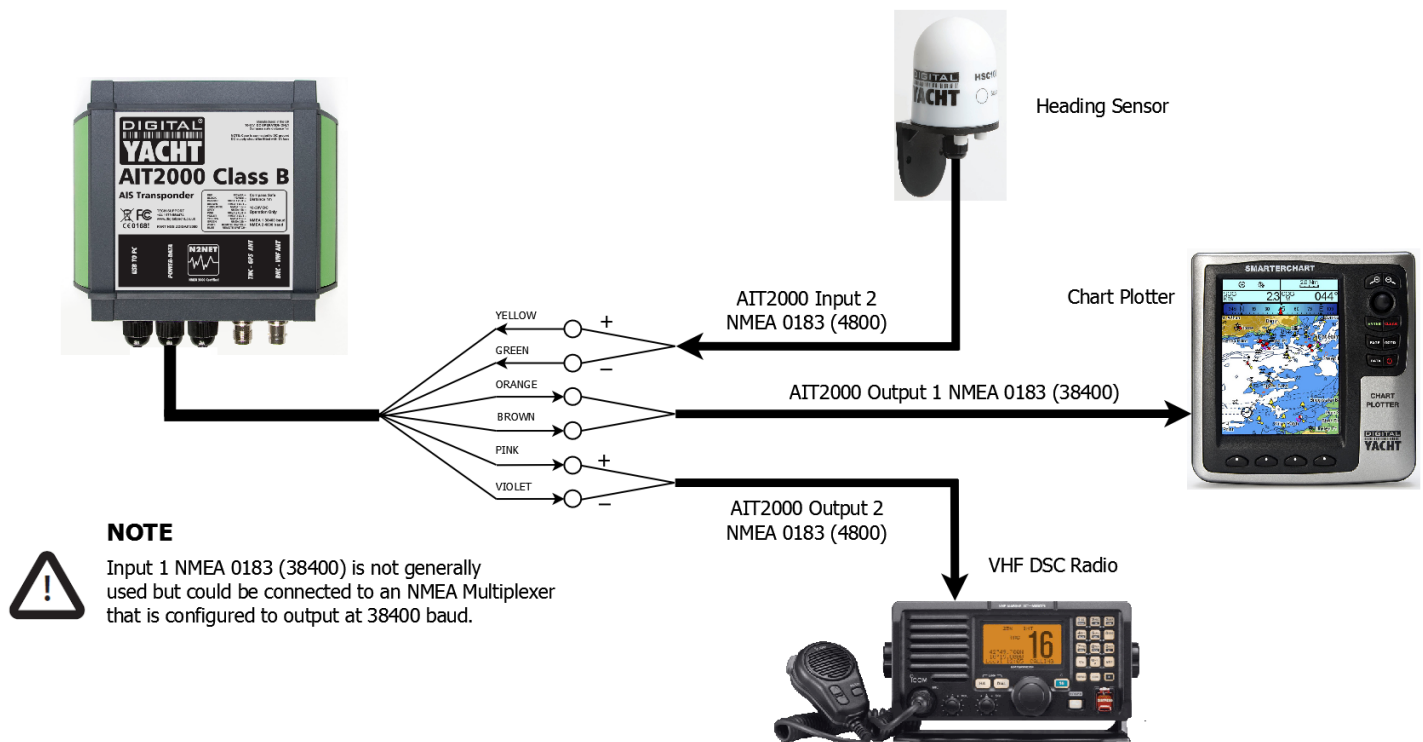

Figure 7

5.8 Connection to an NMEA2000 network (not AIT1500)

The AIT1500N2K, AIT2000 and AIT3000 Transponders also have an N2Net connection which is Digital Yacht's NMEA2000 compliant interface. To connect to other NMEA2000 products, simply find or add a spare NMEA2000 "T" piece on the existing NMEA2000 network and connect the receiver's N2Net connector to the "T" piece.

The N2Net cable is just under 1m long and is terminated in an NMEA2000 Micro Male Connector.

⚠️ The AIT2000 and AIT3000 do not take any power from the NMEA2000 network and the Load Equivalency Number (LEN) of these units is 1.
The AIT1500N2K unit does take its power from the NMEA2000 network and has a Load Equivalency Number (LEN) of 6.

The Class B Transponder outputs AIS and GPS data on to the network (GPS added with V1.7 firmware), it does not provide any other NMEA0183 to NMEA2000 conversion.

The list of AIS PGNs that the Class B Transponder outputs is listed below in Table 2;

PGN No.	PGN Title
129038	Class A Position Report
129039	Class B Position Report
129040	Class B Extended Position Report
129793	AIS UTC and Date report
129794	AIS Class A Static and Voyage Related Data
129800	AIS UTC/Date Inquiry
129801	AIS Address Safety Message
129802	AIS Broadcast Safety Message
129810	AIS Class B static data part B
129809	AIS Class B static data part A
129041	AtoN position report
129025	Position – rapid update
129026	COG/SOG – rapid update

Table 2

5.9 USB Connection (optional)

When connected to a PC or MAC via the USB cable, the Transponder will only get enough power from the computer to power the microprocessor and the AIS receiver. This allows you to program the MMSI number and other static data at home or in the office prior to installation. The Transponder will not transmit or get a valid GPS position fix when only powered from the USB interface and the RED Status LED will always be lit when powered from the USB cable.

If you need to extend the USB cable, please use a USB extension cable that is no more than 4m in length. The maximum length of USB cable without the use of a powered extender cable or Hub is 5m.

Please do not plug in the USB cable of the Transponder to your PC/Mac until after you have installed the proAIS2 software, which also installs the USB drivers for the Transponder. Installing proAIS2 is covered in section 6 - Configuration.

After the Transponder is configured, the USB connection can be used to provide data to navigation program running on a PC or Mac. Please note that only one navigation program at a time can receive data from the Transponder.

The Transponder's USB interface is not fully isolated and high levels of static or large differences in ground voltages between the computer supply and the boat's DC supply can damage the Transponder's USB interface. For maximum reliability, if you intend to permanently connect the Transponder to a computer, we recommend using an NMEA to USB adaptor connected to the Transponder's NMEA0183 output which provides an extra level of protection/isolation and can avoid costly damage to the Transponder.

5.10 Connecting to a power supply

The Class B Transponder should be connected to the ship's 12V or 24V DC power supply typically provided by the vessel's battery.

It is recommended that crimped and soldered lugs are used to connect the AIS transponder to the power source. It is recommended that the power supply is connected via a suitable circuit breaker and/or 3A fuse

- Connect the red wire to a 12V or 24V power supply positive terminal.
- Connect the black wire to the supply negative terminal.

The Class B Transponder will only operate correctly as a Class B transponder when it is connected to an external supply that has a voltage greater than 9.6v. If the supply voltage is less than 9.6v or the Class B Transponder is only powered through the USB cable, then the Class B Transponder's GPS circuitry will be powered down and the unit will only operate in AIS Receiver mode.

The Class B Transponder can be powered from the USB port for configuring the unit (programming MMSI number, etc.) which is useful for initially setting the unit up when first purchased. The following section explains how to configure the Class B Transponder for correct operation.

6.   Configuring Your AIS Transponder

Until correctly configured your AIS class B transponder will only receive AIS messages and will not transmit AIS messages. Before you can configure your Class B Transponder, it is necessary for you to have a unique MMSI number that has been issued to you by the relevant radio or marine authority in your country. If you already have an MMSI number for your DSC VHF Radio, then this is the MMSI number that you will also program in to the Class B Transponder.

There are two potential ways in which your AIS transponder can be configured:

a) Configuration in advance by your dealer or installer, in which case you will need to provide them with all of the boat's data i.e. MMSI number, call sign, vessel name, etc.
b) Configuration using proAIS2

Providing it is acceptable to do so under your local legislation it is possible to configure your AIS transponder yourself using the proAIS2 software provided with the product. proAIS2 is available for both Windows and Mac OSX and setup/installer programs for each operating system are included on the Digital Yacht Software and Driver CD, supplied with the Class B Transponder.

The proAIS2 software provides the facility to configure, monitor and diagnose issues with your AIS transponder. proAIS2 can provide assistance when ensuring that a satisfactory GPS signal is being received. It can also display alarm messages generated by the transponder regarding poor VHF antenna quality or that the power being supplied is outside the range specified for operation. proAIS2 can also be used to activate 'silent mode' which disables AIS transmissions.

Once your Class B Transponder is configured, it is not necessary to run proAIS2 again unless you want to use it for controlling or fault finding the Class B Transponder. If you do not have a compatible chart plotter or PC program for displaying AIS data, then a free copy of our SmarterTrack Lite software is also included on the CD which will run on a Windows PC and provide an AIS "radar" type display of targets on your PC screen.

If your AIS transponder has been configured for you by your dealer or installer you can proceed to the Operation section.

For configuration purposes only, it is possible to power the AIS transponder via its USB connection. This is useful if you wish to configure your AIS transponder away from the vessel power supply. The AIS transponder will not transmit any data or acquire a GPS position fix whilst powered by USB, but it will receive AIS targets if the AIS/VHF antenna is connected and you are in range of other AIS equipped vessels.

6.1   Installing proAIS2 on a Windows PC

For a Window's PC, insert the Digital Yacht Software and Drivers CD in to your PC and browse to the "*proAIS2 for AIT1500+AIT2000+AIT3000*" folder and then double click on the "*proAIS2_V1-4_Windows*" sub-folder and run the **Setup.Exe** file by double clicking on it.

Follow the on-screen instructions, until the Setup program finishes installing the proAIS2 application and the USB drivers for the transponder.

If you do not have a CD drive on your PC, you can download the proAIS2 software from the **Support>Downloads>Software+Utilities** section of our website, a link is given below….

http://www.digitalyachtamerica.com/index.php/en/support/support-manuals/utilities?download=353:proais2-v1-4-windows

6.2   Installing proAIS2 on a Mac

If you are using a Mac, insert the Digital Yacht Software and Drivers CD in to your Mac and browse to the "*proAIS2 for AIT1500+AIT2000+AIT3000*" folder and then double click on the "*proAIS2_V1-4_Mac_OSX*" sub-folder and run the **proAIS2.dmg** file by double clicking on it.

Follow the on-screen instructions, until the extraction program finishes installing the proAIS2 application and the USB drivers for the transponder.

If you do not have a CD drive on your Mac, you can download the proAIS2 software from the **Support>Downloads>Software+Utilities** section of our website, a link is given below….

http://www.digitalyachtamerica.com/index.php/en/support/support-manuals/utilities?download=419:proais2-v1-4-mac-for-ait2000

6.3   Running proAIS2

Locate the proAIS2 application on your computer and launch the program. You will see a screen like the one shown below in Fig.9. To communicate with the Class B Transponder, proAIS2 needs to know which port the USB interface has been allocated by the computer's operating system. For Windows and OSX, the Class B Transponder USB interface will be installed as an "AIS Virtual COM Port"
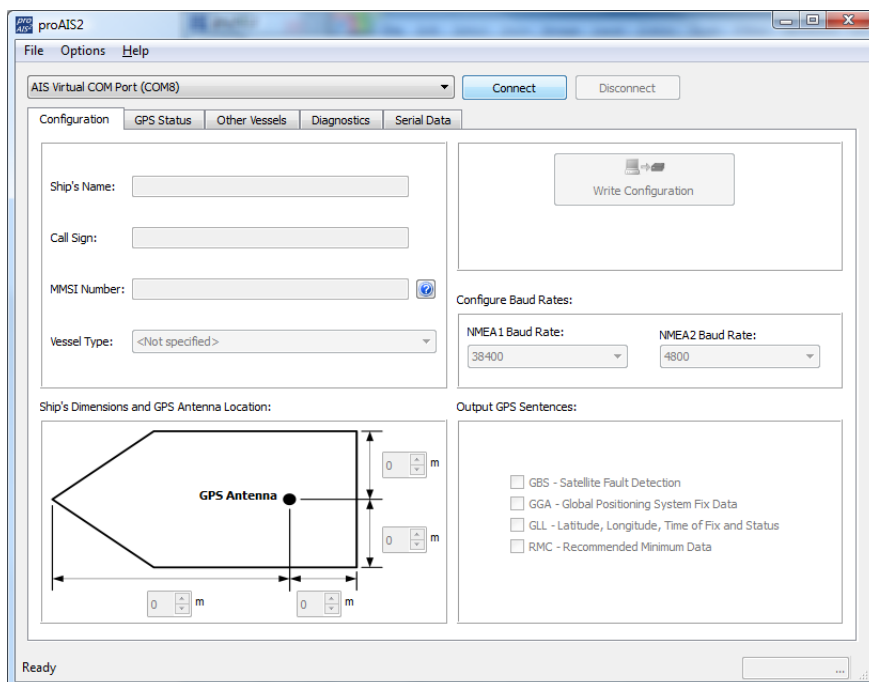
.

Figure 8

In most cases the proAIS2 software will show the "AIS Virtual COM Port" as the default device to connect to, but if you have other serial port adaptors on your computer, you may have to click on the selection box and select "AIS Virtual COM Port" as the device to connect, so that your screen looks the same as Fig.9.

Once selected, click the "Connect" button and the proAIS2 software will start querying the Class B Transponder to see what settings it has. Assuming that the Class B Transponder is a new unit, the Data boxes will all be blank and you are now ready to enter your own vessel's static data and program it in to the Class B Transponder.

You should enter the following information in order to configure your AIS transponder:

- Your unique MMSI number
- The Vessel's Registered Name
- Vessel type
- VHF Call sign
- Vessel dimensions and position of your GPS antenna installation.

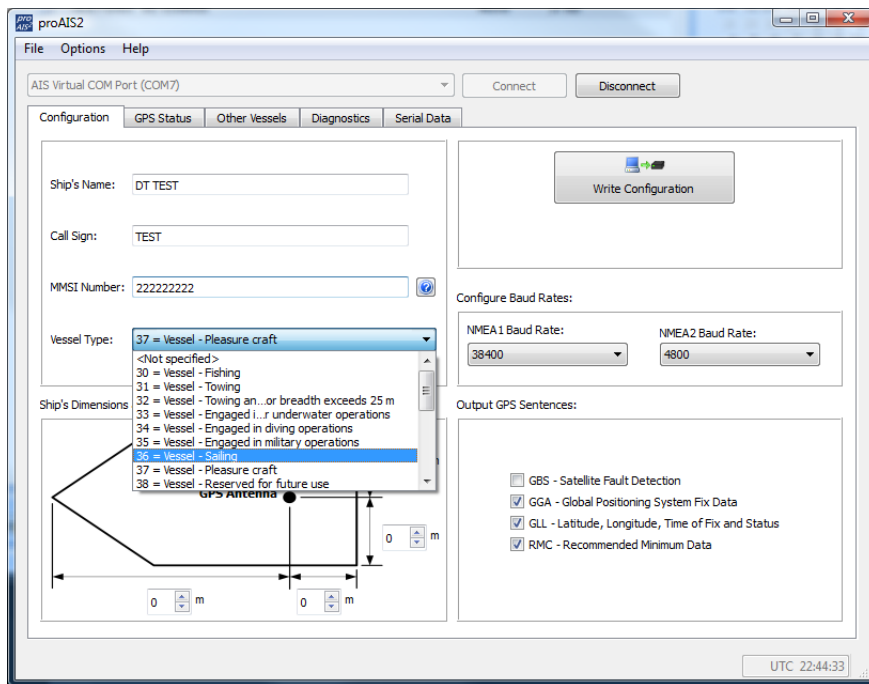Below is a screen shot showing how the data can be entered.

Figure 9

It is recommended that all Baud Rates and GPS Output Sentences are not changed from these defaults, which have been chosen for maximum compatibility with the most common installations.

Once this data is entered, please double check all of the values, paying particular attention to the MMSI number as once set this cannot be changed without the unit being returned to Digital Yacht.

Once you have checked that the data is correct, click the "Write Configuration" button and you will see the final warning window shown in Figure 10.
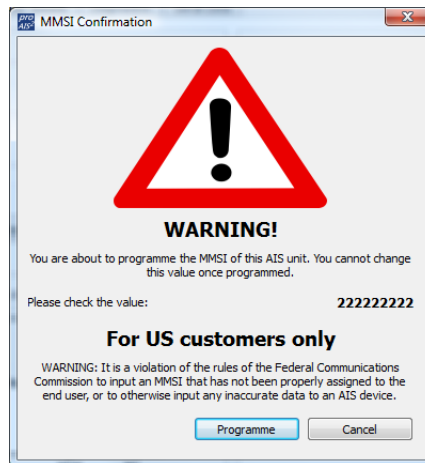
Figure 10

If you are 100% sure that everything is correct, click the "Programme" button and your Class B Transponder will now be programmed/configured with the data you have entered.

If your Class B Transponder is installed and fully powered up from the boat's 12v or 24v supply, then the Class B Transponder's GPS will now start to operate. Click on the "GPS Status" tab, to see the satellite signal strengths (see Fig.11). You need a minimum of 4 satellites with >20dBHz signal strength to get a position fix.
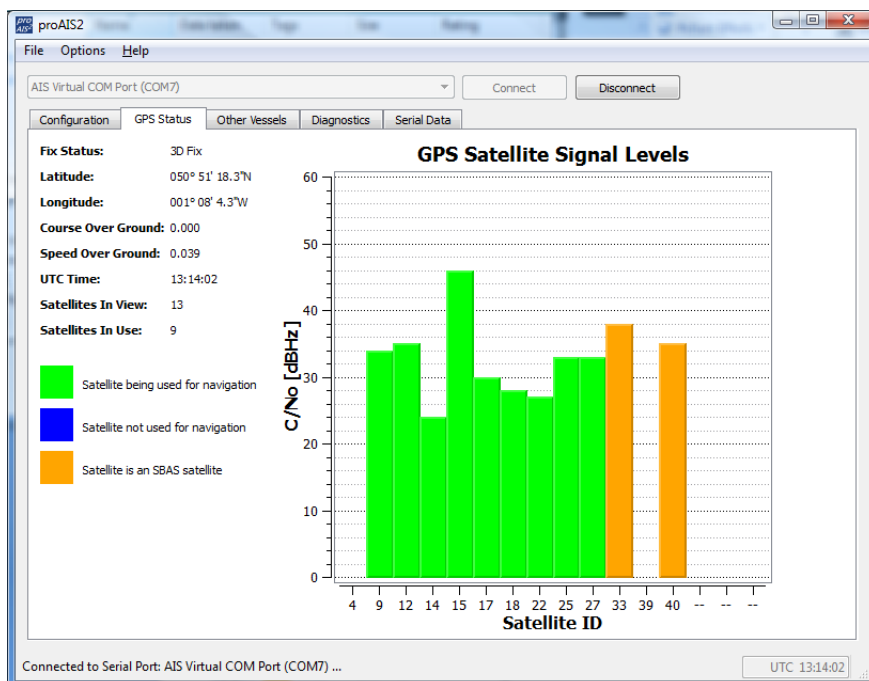

Figure 11

Once a GPS position fix is received, the Class B Transponder will attempt to make a transmission report. To see this occur, click on the "Diagnostics" tab and within a few minutes, the Class B Transponder should make its first transmission report, five green ticks should be displayed as shown in Fig.12.
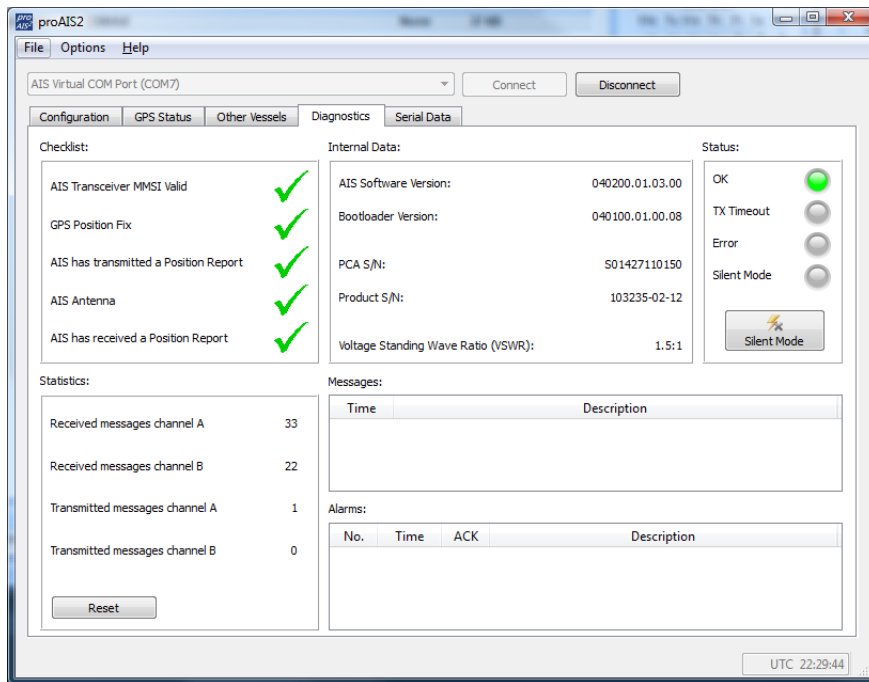
Figure 12

From this screen it is also possible to control the Class B Transponder and stop it transmitting your position by clicking on the "Silent Mode" button. To start it transmitting again, simply click the same button again which is now labelled "Stop Silent Mode".

⚠️ For further assistance in configuring your AIS transponder please refer to the Help menu within proAIS2.

7. Operation

Switching on your AIS transponder for the first time

The following section assumes that the Class B Transponder has either been pre-configured by a dealer or that you have configured it yourself using proAIS2. If this is not the case, please consult Section 6 before continuing.

When the Class B Transponder powers up, the Green LED will illuminate briefly, then all four LEDs will flash once and then one or more of the LEDs will illuminate depending upon the configuration state of the unit. The table below shows the functions of the four indicators.

Indicator	Function
Green	Unit is powered up and operating normally
Amber	Unit is in a 'transmit timeout' period
Red	Unit has experienced an error
Blue	Silent mode is activated

Under normal circumstances, the Yellow LED will flash whilst the Class B Transponder is waiting for the GPS to get a position fix and make its first AIS transmission. This usually takes less than 3-4 minutes and once completed the Yellow LED will stay ON. There will now be a short period (less than 30 seconds) before the Transponder makes its first transmission and if this is successful the Green LED will illuminate and the Yellow LED will go OFF.

The Class B Transponder is now transmitting your position and as long as the Green LED is illuminated, you can be sure that the Class B Transponder is working correctly. The unit is constantly monitoring the supply voltage, GPS position and AIS transmission and if any of these go outside of the normal operating specification, the Class B Transponder will turn off the Green LED and turn on the Red or Yellow LED.

7.1 Switch functions

If you have installed an external "Silence" switch or you are using the proAIS2 software to control the Class B Transponder, you can put the Class B Transponder into 'silent mode'. In silent mode the transmission of your own vessel position ceases, whilst the reception of other vessel's AIS position continues.

With the number of AIS equipped vessels increasing, it is good etiquette to only transmit in poor visibility, when crossing a busy shipping lane or if taking part in a yacht race. At all other times you should use silent mode to stop your AIS transmission from creating unnecessary clutter on other vessels chart systems.

When silent mode is active the blue indicator will be illuminated.

7.2 Indicator functions

The AIS transponder includes four coloured indicators as shown below. The state of the indicators provides information regarding the status of the AIS transponder.

The meaning of typical indicator configurations is shown in Table 3 on the next page. The images shown are of an AIT2000, but the LED indications are common for all three transponders.

	Green indicator only • The AIS transponder is powered up, has a position fix and has transmitted at least one vessel information report. Everything is working correctly.
	Green indicator flashing • Indicates possible Boot Loader (software corrupted) or PA Transmitter fault – contact Digital Yacht for advice on this condition.
	Red indicator only • During normal operation the AIS transponder has detected a system error. • Usually indicates low supply voltage but check cause of the error in proAIS2.
	Red indicator flashing • During normal operation the AIS transponder has detected a high VSWR reading, which usually indicates a VHF antenna or Splitter (if fitted) problem.
	Green and Blue indicators • The "Silent" switch has just been operated and transmitting has stopped. • Within 3 minutes the LED combination will change to Yellow and Blue.
	Yellow and Blue indicators • "Silent mode" has been activated using the optional silent mode switch or via proAIS2 and this combination of indicators is illuminated to show that the transmitter is disabled.
	Red and Blue indicators • This indicates that a system error has occurred whilst the unit is in "Silent mode" unless the cause of the error is removed, the unit will not be able to start transmitting again when "Silent mode" is exited.
	Yellow indicator only • The AIS radio channels are exceptionally busy so there is currently no available timeslot for transmission. • The unit has just exited silent mode and this yellow indicator will illuminate until the first AIS message has been sent. • The AIS transponder has been commanded by the local authority (via an AIS base station) to cease transmissions.
	Yellow indicator flashing • The unit has just turned on and is obtaining a position fix prior to transmitting its first vessel information report (typically takes 3-4 minutes). • Position fix has been lost. The AIS transponder will attempt to regain position fix for 30 minutes before entering an error state.
	Red and Yellow indicators • This is a new Class B Transponder unit that has not yet been properly configured with an MMSI number. • The unit is only getting power via the USB cable.

Table 3

8. Troubleshooting

Issue	Possible cause and remedy
No data is being received by the chart plotter	• Check that the power supply is connected correctly. • Check that the power supply is a 12V or 24V supply. • Check that the connections to the chart plotter are correct. • If connected via NMEA0183, ensure that you have set the input port on the chart plotter to 38400 baud
No indicators are illuminated	• Check that the power supply is connected correctly. • Check that the power supply is a 12V or 24V supply.
The Red 'error' indicator is illuminated or flashing	• The unit may not have a valid MMSI. Check that the AIS transponder is correctly configured with a valid MMSI. • The VHF antenna may be faulty. Please check the connection to the VHF antenna and that the VHF antenna is not damaged. The red indicator may illuminate briefly if the power supply is interrupted or the VHF antenna characteristics are briefly affected. • No GPS position fix can be obtained. Please check the transceiver is located where the internal GPS antenna has a clear sky view or that an external GPS antenna is properly connected and installed. Review the GPS signal strength graph available in proAIS2. • The power supply is outside the allowable range. Check that the power supply is within the range 9.6V to 31.2V. • If none of the above suggestions, correct the error condition please contact your dealer for advice. • Check for error and alarm messages in proAIS2
My MMSI is being received by other vessels but my vessel name is not shown on their chart plotter or PC	• Some older AIS devices and chart plotters do not process the specific NMEA0183 Class B AIS message which provides the vessel name (message 24). This is not a fault of your AIS transponder. A software upgrade may be available for older chart plotters which will correct this issue. The other vessel should update its AIS unit or chart plotting software to receive AIS message 24. • Some newer chart plotters do not accept the Class B static data PGN via NMEA2000. Contact the manufacturer of your chart plotter to see if a software upgrade to fix this problem is available.

For more troubleshooting information on the Class B Transponder please consult Tech Note 00036-2012 in the Support section of www.digitalyacht.co.uk

9.   Specifications

Parameter	Value
Dimensions	AIT1500 - 160mm x 120mm x 37.5mm (W x H x D) AIT2000 - 150mm x 155mm x 37.5mm (W x H x D) AIT3000 – 220mm x 130mm x 55mm (W x H x D)
Weight	850g (transponder unit only)
Power	DC 9.6V - 31.2V with peak current rating 2A Average power consumption of AIT1500/2000 is 300mA at 12VDC Average power consumption of AIT3000 is 500mA at 12VDC
GPS Receiver (Internal)	50 channel IEC 61108-1 compliant
Electrical Interfaces	USB 2 x NMEA0183 Ports (38.4k + 4.8K baud) NMEA2000 – LEN = 1 (Load Equivalency Number)
Connectors	VHF antenna connector (BNC) External GPS antenna TNC connector (not AIT1500) USB type A 1m cable NMEA2000 standard connector with 1m cable (not AIT1500) 12 way power input / NMEA0183/External switch
VHF Transponder	Transmitter x 1 Receiver x 2 (One receiver time shared between AIS and DSC) Frequency: 156.025 to 162.025 MHz in 25 kHz steps
Output Power	33dBm ± 1.5 dB
Channel Bandwidth	25kHz
Channel Step	25kHz
Modulation Modes	25kHz GMSK (AIS, TX and RX) 25kHz AFSK (DSC, RX only)
Bit rate	9600 b/s ± 50 ppm (GMSK) 1200 b/s ± 30 ppm (FSK)
RX Sensitivity	Less than -107dBm at 20% PER Co-channel 10dB Adjacent channel 70dB IMD 65dB Blocking 84dB
Environmental	Water resistant to IPx5 Operating temperature: -25 C to +55 C
Indicators	Power, TX timeout, Error, Silent Mode Status