



CAMINO-108

AIS Class B

USER MANUAL



Automatic Identification System

COPYRIGHT

The entire contents of this instruction manual, including any future updates, revisions, and modifications, shall remain the property of AMEC at all times. Unauthorized copies or reproduction of this manual, either in part or whole, in any form of print and electronic media, is prohibited. The contents herein can only be used for the intended purpose of this manual.

DISCLAIMER

AMEC is devoted to publish and maintain this product manual. As we continue to improve our AIS products to satisfy all customers' needs, information in this document is subject to change without notice. AMEC does not make any representations or warranties (implied or otherwise) regarding the accuracy and completeness of this document and shall in no event be liable for any loss of profit or any commercial damage, including but not limited to special, incidental, consequential, or other damage.

WARNING!

WARNING: The transponder must be installed and configured in conformity with the provided instructions in the manual in order to maximize the device performance.

WARNING: Please bear in mind that not all vessels are equipped with AIS transponders and therefore may not be visible to this transponder. Likewise, certain conditions, such as device malfunction, the environment, improper use, and overcrowded port traffic, may exist whereby the vessel equipped with this AIS transponder is not visible to other AIS transponders.

WARNING: DO NOT DISASSEMBLE OR MODIFY THE EQUIPMENT. Improper disassembly or modification could cause personal injury and will invalidate the guarantee.

WARNING: While most of the installation can be performed by the owner or the crew, a final commissioning can be done by your local agent/dealer when needed or required. AMEC and the local agent/dealer will not bear any responsibilities over any damages resulted from improper installation by unauthorized agent/dealer.

FOR USERS IN THE UNITED STATES OF AMERICA ONLY

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 entry of static data into this device shall be performed by the vendor of the device or by an appropriately qualified person in the business of installing marine communications equipment on board vessels.

★ Instructions on how to accurately enter and confirm static data in the device can be found in this user manual.

FOREWORD

AMEC thanks you for the purchase of your new CAMINO-108 Automatic Identification System (hereinafter called "AIS"). Wherever you sail now, you can have a better control of your surrounding sea, and have an enjoyable voyage.

CAMINO-108 is strictly tested at the factory to meet the rigorous demands of the marine environment. With proper use, installation, and maintenance, the equipment will serve loyally and reliably at its optimum.

For sales, services, and technical supports, please contact your local AMEC representatives or Alltek Marine Electronics Corp at sales@alltekmarine.com or service@alltekmarine.com. You are always welcome to visit our website at www.alltekmarine.com for new product status and company update.

Thank you again. Be safe.

TABLE OF CONTENT

1	SYSTEM OVERVIEW	8
1.1	PRODUCT DESCRIPTION	8
1.2	EQUIPMENT IN THE BOX.....	10
1.3	EXTERNAL CONNECTIONS	11
1.4	WHAT IS AIS?.....	12
1.4.1	Class A vs. Class B AIS	14
1.4.2	AIS Message Types.....	15
1.4.3	AIS Report Rate.....	15
2	INSTALLATION.....	16
2.1	INSTALLATION PROCEDURES	16
2.2	MOUNTING TRANSPONDER MAIN UNIT	17
2.3	VHF ANTENNA INSTALLATION	19
2.4	GPS ANTENNA INSTALLATION	20
2.5	CONNECTING POWER AND DATA CABLE	21
2.6	CONNECTING WITH NMEA 0183 DEVICES	23
2.7	AIS SILENT MODE CONNECTION.....	26
2.8	CONNECTION TO NMEA 2000 NETWORK.....	26
2.9	CONNECTING TO A CHARTING PROGRAM VIA USB	28
2.10	CONNECTING TO POWER SUPPLY.....	28
3	CONFIGURING YOUR CAMINO-108.....	29
3.1	CONNECTING TO YOUR AIS TRANSPONDER.....	29
3.1.1	Required Items	29
3.1.2	Installing “AIS Configuration Tool”	30
3.1.3	Three steps to connect the AIS transponder	30
3.1.4	Home page of the application.....	31
3.2	PROGRAMMING YOUR VESSEL DATA	32
4	GET STARTED	34
4.1	START UP THE TRANSPONDER	34

4.2	LED INDICATORS.....	35
4.3	SD CARD DATA LOGGING.....	37
4.4	WI-FI CONFIGURATION (CAMINO-108W ONLY).....	38
4.4.1	Access Point Mode.....	39
4.4.2	Client Mode.....	42
4.5	BUILT-IN INTEGRITY TEST (BIIT).....	44
5	SPECIFICATIONS.....	45
5.1	PRODUCT SPECIFICATIONS.....	45
5.2	DIMENSIONS.....	48
5.3	NMEA 2000 PGN INFORMATION.....	50
5.4	SUPPORTED NMEA 0183 SENTENCES.....	52
6	TROUBLESHOOTING.....	53
7	ABBREVIATIONS.....	57
8	FCC INTERFERENCE STATEMENT.....	58
9	RF EXPOSURE WARNING.....	59
	DECLARATION OF CONFORMITY.....	60
	INDUSTRY CANADA NOTICE.....	60
	AMEC WORLDWIDE WARRANTY.....	61
	APPENDIX: HOW TO DETERMINE SERIAL PORT.....	63

1 System Overview

1.1 Product Description

CAMINO-108 is globally certified AIS class B AIS transponder. It allows automatic exchange of vessel data with other AIS equipped vessels within VHF range – the essential way of collision avoidance on the water.

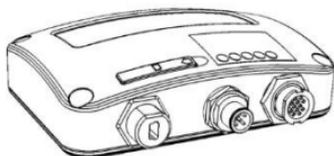
The unit is designed to provide high performance and great reliability, resulting from our years-long field experience. It contains 1 VHF transmitter, 2 AIS receivers on 2 VHF channels and 1 MCU with cutting edge software defined radio technology.

Chart plotter, PC and Mac can be integrated with ease over its waterproof NMEA2000, NMEA0183 or USB port. The integrated high-performance Wi-Fi (CAMIN-108W only) together with AMEC AIS App makes your favorite smartphone or tablet a real-time AIS position plotter.

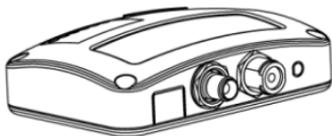
CAMINO-108 series features GNSS receiver with 72 channels supporting GPS and GLONASS by default and optional BeiDou and Galileo.

Its built-in data logger can record AIS data on SD card in the most intuitive way. Silent mode activation is built in either over wiring or optional switch box.

CAMINO-108

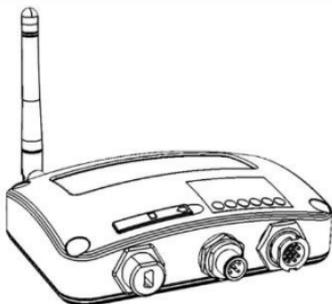


Front

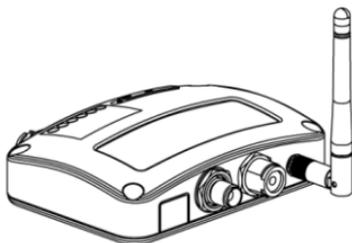


Back

CAMINO-108W



Front



Back

1.2 Equipment in the Box

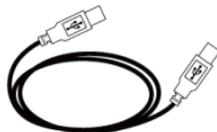
Upon receiving the product, please verify items in the box. If any is missing, please contact your local AMEC representative immediately.



Class B AIS Transponder



12pin power and
NMEA0183 cable



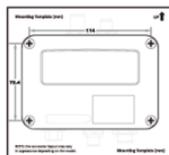
Mini USB to USB cable



User Manual



M3.5x25 Screws



Mounting Template



Wi-Fi Antenna
(108W only)

Optional Accessory

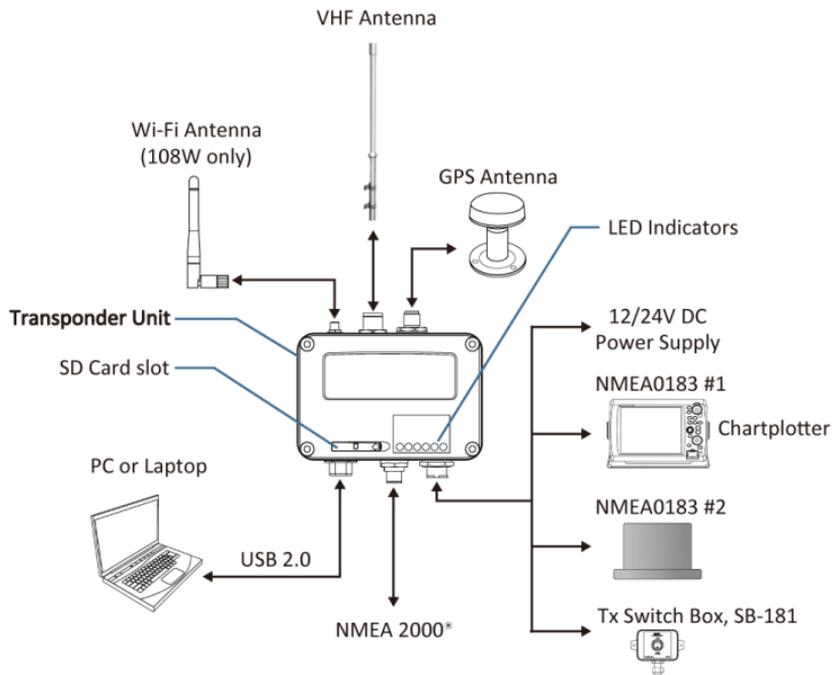


GPS antenna GA-22
with 10m cable



GPS antenna PA-02
with 3m cable

1.3 External Connections



1.4 What is AIS?

The Automatic Identification System (AIS) is a Very High Frequency (VHF) radio broadcasting system that transfers packets of data over the VHF data link (VDL) and enables AIS equipped vessels and shore-based stations to exchange identification information and navigational data. Ships with AIS transponders continually transmit their ID, position, course, speed and other data to all nearby ships and shore stations. Such information can aid greatly in situational awareness and provide a means to assist in collision avoidance.

AIS equipment is standardized by ITU, IEC, IALA and IMO and is subject to approval by a certification body. The following AIS devices have been developed for variant applications.

- **AIS Class A:**

mandated by the IMO for vessels of 300 gross tonnages and upwards engaged on international voyages, cargo ships of 500 gross tonnages and upwards, as well as passenger ships. It transmits typically on 12.5 watt output power.

- **AIS Class B:**

provides limited functionality and is intended for non-SOLAS commercial vessels and recreational vessels. It transmits typically on 2 watt output power.

- **AIS Receiver:**

only receives AIS signal and it does not have transmitter to send out AIS signal. Suitable for recreational vessel that does not want to send out its vessel information.

- **AIS Base Station:**

is provided by aids-to-navigation authorities to enable the ship to shore / shore to ship transmission of information. Networked AIS Base Stations can assist in providing overall maritime domain awareness.

- **AIS AtoN (Aids to Navigation):**

provides an opportunity to transmit position and status of buoys and lights through the same VDL, which can then show up on AIS-ready devices within the range.

- **AIS SART:**

Search and Rescue Transmitter using AIS can be used to assist in determining the location of a vessel in distress. It is typically used on life rafts.

- **AIS on Search and Rescue (SAR) Aircraft:**

used on airplanes and helicopters to assist search and rescue operation.

1.4.1 Class A vs. Class B AIS

A brief comparison of class A and class B AIS is illustrated in the following table. CAMINO-108 is a CSTDMA Class B AIS transponder.

Table 1-1 Comparison of Class A and Class B

Type of AIS	Class A AIS	Class B SOTDMA	Class B CSTDMA
Primary Access Scheme	SOTDMA (Self-organizing)	SOTDMA (Self-organizing)	CSTDMA (Carrier-Sense)
Standard	IEC 61993-2	IEC 62287-2	IEC 62287-1
Transmit Power and range	12.5W	5W	2W
IMO Mandate	Mandatory for all SOLAS vessels	No mandate	No mandate
Reporting rate dynamic data	Highest (transmission up to every 2 sec)	Higher (transmission up to every 5 sec)	Low (transmission up to every 30 sec)
AIS data presented	Static, Dynamic, Voyage	Static and Dynamic data	Static and Dynamic data
Applications	Commercial vessels, fishing boats, working boats, passenger boats with more than 12 passengers	Smaller commercial, fishing and work boats, recreational vessels	Recreational vessels and small fishing boats

1.4.2 AIS Message Types

Class B AIS broadcasts following message types:

Static Data:

- MMSI
- Vessel name
- Vessel call sign
- Type of ship
- Ship dimensions / GPS antenna location

Dynamic Data:

- Position of the vessel
- Course over ground (COG)
- Speed over ground (SOG)
- True heading

1.4.3 AIS Report Rate

Class B AIS broadcasts ship dynamic data per following reporting interval. Besides, ship static data will be broadcasted every 6 minutes.

Ship Condition	Nominal Reporting Interval
Ship not moving faster than 2 knots	3 Minutes
Ship moving faster than 2 knots	30 Seconds

2 Installation

2.1 Installation Procedures

Please familiarize the manual content before begin installation. Depending on your hardware configuration, use the following recommended steps for installation.

- 1) Mount the transponder unit to an appropriate location
- 2) Install VHF antenna
- 3) Install GPS antenna
- 4) Connect antenna cables to the transponder
- 5) Connect to a chart plotter and/or other instruments via NMEA 0183, NMEA 2000 or USB
- 6) Make silent mode connection if applicable (optional external switch needed)
- 7) Connect to an appropriate power source (12V / 24V DC, 2A)
- 8) Power On the power source (which turns on the transponder unit)
- 9) Program MMSI and vessel information into the device using configuration software before installation (please refer to chapter 3)
- 10) Perform LED checking and system functional test

2.2 Mounting Transponder Main Unit

The following guidelines should be noticed when selecting the environment to install your AMEC CAMINO-108:

- Do not install the AIS transponder in a flammable or hazardous atmosphere such as in an engine or generator room or close to fuel tanks.
- Installation of the transponder should be undertaken in a safe environment without being exposed to any splashing water or rain.
- There should be adequate space around the AIS transponder for routing of cables. See figure below for details of the AIS transponder dimensions.
- The safe distance of the transponder to any magnetic compass is at least 0.55m.
- The operating temperature is between -15°C and +55°C.
- The AIS transponder can be installed and mounted on flat surface, or it can be mounted on wall with the four self tapping screws supplied.
- The device should be mounted in a location where the indicators can readily be observed as these indicators deliver relevant information on the status of the AIS transponder.
- For safety reason, it's recommended to mount the device not higher than 2m (78.74") above floor-level.

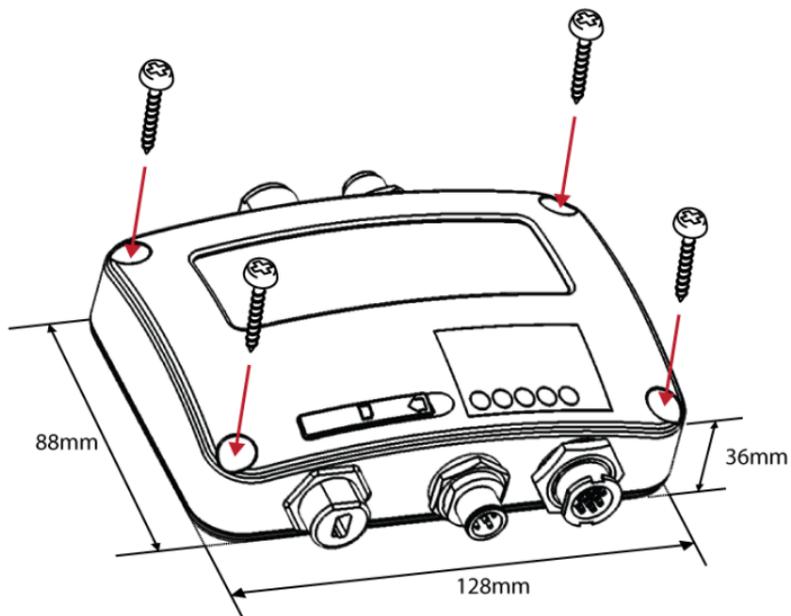


Figure 1 **Mounting the transponder**

2.3 VHF Antenna Installation

The quality and positioning of the antenna are the most important factors dictating AIS performance. It is recommended that a VHF antenna with omnidirectional vertical polarization be specifically tuned for marine band. Since the range of VHF signals is largely decided by line of sight distance, the VHF antenna should be placed as high as possible and at least 5 meters away from any constructions made of conductive materials.

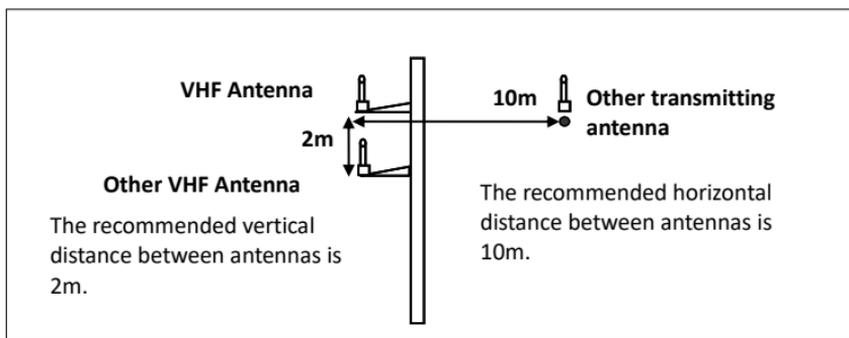


Figure 2 VHF Antenna Locations

2.4 GPS Antenna Installation

Install the GPS antenna where it has a clear view to the sky, so that it may access the horizon freely with 360° degrees with a vertical observation of 5 to 90 degrees above the horizon.

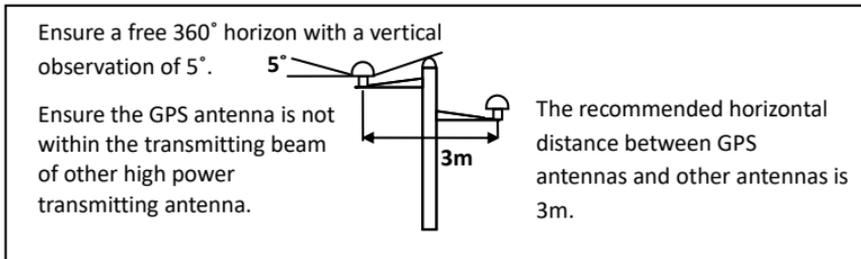


Figure 3 GPS Antenna Locations

It is recommended to keep the GPS antenna out of the transmitting beam of high-power transmitters such as Inmarsat devices and radar.

When connecting the cables, take note of the following precautions.

- Sharp bending of the cable may cause damage to the inner wires and impair the overall performance.
- The coaxial cable should be run separately to other cables.
- Insulation tape on the GPS connector on the coaxial cable is recommended.

CAMINO-108 series is tested with the GPS antenna GA-22. It's recommended to use GA-22 to ensure optimal reliability of your AIS system.

2.5 Connecting Power and Data Cable

Connecting the CAMINO-108 to external power source and data equipment are illustrated in diagram below.

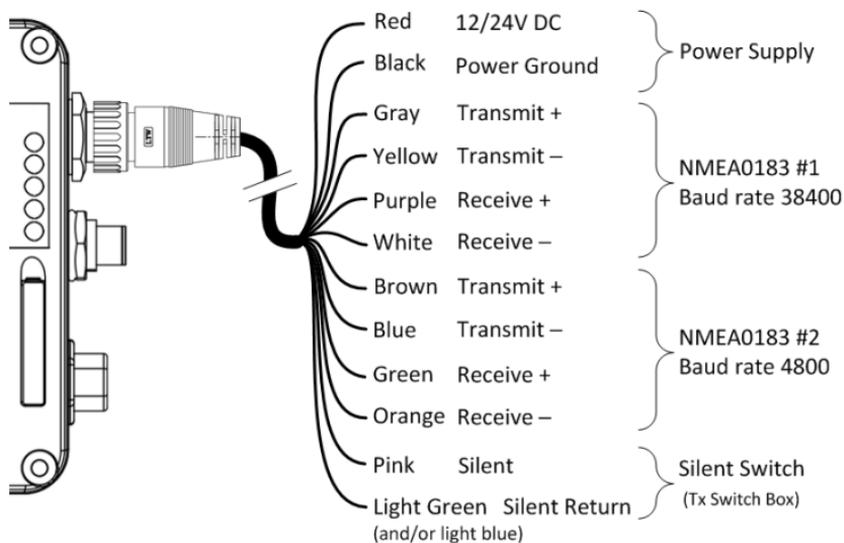


Figure 4 **Wiring instructions**

When wiring NMEA 0183 to AIS-ready equipment, please refer to your equipment manual first.



CAMINO-108W supports only one configuration baud rate configuration for Tx/Rx on NMEA 0183 port #2.



During installation, you may have to peel off some wires to make the appropriate connections. After completing the installation, please cover all exposed wires with a rubber-vulcanized tape to prevent the devices from malfunctioning or short-circuited.

2.6 Connecting with NMEA 0183 Devices

CAMINO-108 has two NMEA 0183 ports and each NMEA 0183 port's transmitting and receiving interface can be configured to 4800, 9600, or 38400 baud rate independently. The default NMEA 0183 baud rates are 38400-bps (high speed) and 4800-bps (low speed). User can change the baud rates using the provided "AMEC AIS Class B Configuration" software. Typically the high speed setting is primarily for chart plotter connection, while the low speed setting can be used for NMEA 0183 compatible instruments.

CAMINO-108 NMEA 0183 supports multiplexer function. The received NMEA 0183 data from both ports will be multiplexed and forwarded to both NMEA 0183 output ports, USB and Wi-Fi (CAMINO-108W).



Figure 5 NMEA 0183 Connection illustration

NMEA 0183 Signal (CAMINO-108)	Signal Direction (CAMINO-108)	External NMEA 0183 Device
Receive + (RXP)	Input	n/a
Receive – (RXN)	Input	n/a
Transmit + (TXP)	Output	Data Input + (RXP)
Transmit – (TXN)	Output	Data Input – (RXN)



Note: It is not recommended to connect the CAMINO-108 directly to RS232 devices over NMEA 0183. However, when RS232 devices are needed, please follow the instruction at www.alltekmarine.com under CAMINO-108's FAQ

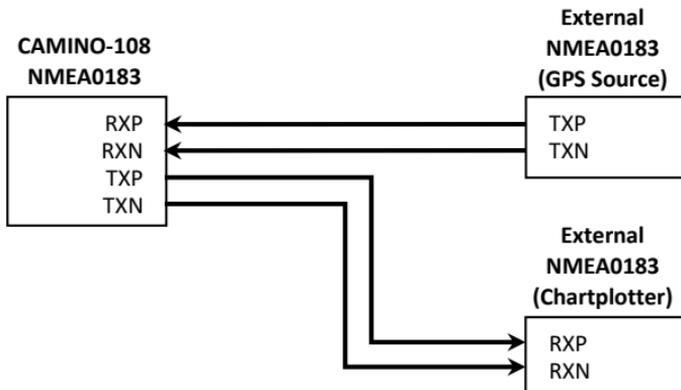


Figure 6 NMEA 0183 Multiplexing Connection

NMEA 0183 Signal (CAMINO-108)	Signal Direction (CAMINO-108)	External NMEA 0183 Devices
Receive + (RXP)	Input	Data Output + (TXP)
Receive - (RXN)	Input	Data Output - (TXN)
Transmit + (TXP)	Output	Data Input + (RXP)
Transmit - (TXN)	Output	Data Input - (RXN)

2.7 AIS Silent Mode Connection

If you require Silent Mode feature, it is possible to connect an external toggle switch to CAMINO-108. Connect the toggle switch between the pink and light green (and/or light blue) wires to enable Silent Mode function, as depicted in Figure 4. An optional external Tx Switch Box (part number SB-181) is available from AMEC to turn on/off the AIS transmission.

2.8 Connection to NMEA 2000 Network

The CAMINO-108 is equipped with NMEA 2000 interface with LEN=1. CAMINO-108 is able to send **AIS** data and forward received **GPS** data (from internal GPS antenna) via NMEA 2000 network to other NMEA 2000 devices. An updated PGN list is available at AMEC website under FAQ for CAMINO-108.

A compatible T-connector and drop cable available by your local service partner are needed to connect the class B transponder to your chart plotter with NMEA 2000 interface.

CAMINO-108 series works with GPS input from both NMEA 2000 and NMEA 0183 to back up your external GPS antenna. The GPS input priority is external GPS antenna → NMEA 0183 → NMEA 2000.

When there are multiple GPS sources available on the NMEA 2000 bus, the CAMINO-108 series will pick the source following the criteria below:

- The source has the lowest device source address
- The source has a valid GPS position fix

Please refer to 5.3 and 5.4 for more info about the related NMEA 2000 and NMEA 0183 sentences for GNSS reception support.

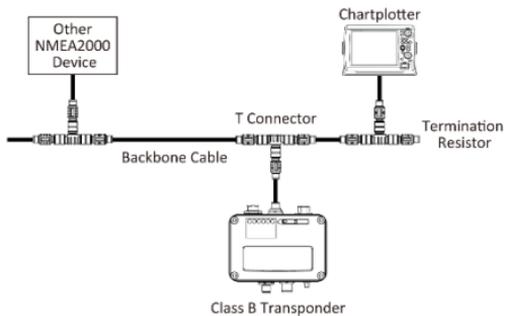


Figure 7 **NMEA 2000 Network**

2.9 Connecting to a charting program via USB

Your transponder can be used as a source of AIS for electronic charting and navigation program (PC/Mac) such as NaviPro, TimeZero, Coastal Explorer or OpenCPN etc. Follow the steps below to connect the transponder to the software:

- Connect the transponder to your PC or Mac using the USB cable that comes with the package. In most cases, the USB driver will be installed automatically. When it's not the case, you can find the driver from our website www.alltekmarine.com/support/download and install it manually.
- Make sure the baud rate is set at *115200*. The data port can be confirmed by running the Device Manager on your computer or be detected automatically depending on the software.

2.10 Connecting to Power Supply

The CAMINO-108 requires a 12V or 24V DC power supply (9.6 to 31.2V) capable of supplying 2A peak current. The red wire and the black wire on the 12 pin cable are used to connect the power supply's positive and negative terminals. Practically, it is suggested to use the fuse panel before connecting directly to the battery/power supply.

3 Configuring Your CAMINO-108

Your class B transponder is delivered with a powerful “AIS Configuration Tool” allowing users to set up the transponder and make a real-time diagnosis. A more detailed user guide of configuration tool can be found in the “Help” of the software.

3.1 Connecting to your AIS Transponder

3.1.1 Required Items

Before preceding the configuration procedure, make sure the following items are available:

- AIS Configuration Tool (PC/Mac) and USB driver which are available for download from www.alltekmarine.com/support/download
- USB cable (included in the box)
- Mac OS X 10.6 and later or Microsoft® Windows® (including both 32 and 64-bit versions)
- One available USB port on PC/Mac



Note: For configuration and firmware upgrade purpose, CAMINO - 108 series can be powered only by USB. When USB power is in use, the device will not transmit any data. To configure the Wi-Fi of CAMINO-108W, a regular 12/24V DC power supply is required.

3.1.2 Installing “AIS Configuration Tool”

The “AIS Configuration Tool” must be installed before connecting your transponder to your PC or Mac. The AIS Configuration Tool (PC/Mac) is available for download from www.alltekmarine.com/support/download. Unzip the downloaded file and navigate to the folder for

Windows: Double-click the ‘setup.exe’ item to start the installer and follow the on-screen instructions.

Mac: Double-click the ‘AISConfigurationTool.dmg’ file. A new Finder window will open and drag the “AIS Configuration Tool” to the Applications folder to complete the installation process.

You can now launch the application from the Windows® Start menu or the Mac Applications folder.

3.1.3 Three steps to connect the AIS transponder

Step 1:

Connect your Class B AIS transponder to your PC or Mac using a USB cable. In most cases the USB driver will be installed automatically by Windows system. When it’s not the case, you can find the driver from our website www.alltekmarine.com/support/download and install it manually. Follow the on-screen instructions and assign the correct file path of the USB driver to complete the installation.

Step 2:

Select the “Com Port” corresponding to your AIS transponder from the drop-down menu at the top left of the window, normally listed as “AIS Virtual Com”.

Step 3:

Click the ‘Connect’ button. In a short moment, the button will be displayed as “Disconnect” when the connection is established.

3.1.4 Home page of the application

The application is now communicating with your AIS transponder and will display any pre-configured vessel data on the 'Home' page depicted as follows.

AIS Configuration Tool

Com Port: [Disconnect](#)

Configuration

Ship's Name
Call Sign
MMSI
Vessel Type **37 = Vessel-Pleasure craft**

[More...](#)

Diagnostics

Product Serial Number
Product Firmware Version **V1.1.5.03**

[More...](#)

GNSS Status

[More...](#)

Other Vessels

MMSI	Ship's Name	Call Sign	Range (NM)	Bearing (°)
001193046	NAUTICAST	D11233	--	--
100000000			--	--
209370000			--	--
372462000			--	--
416000032			--	--

[More...](#)

Wi-Fi

Wi-Fi Mode: **Access Point** Wi-Fi Module Firmware Version: **1.2.5**

[More...](#)

Wi-Fi setting is only available when Wi-Fi module on the AIS device is detected.

3.2 Programming your vessel data

After the device is successfully connected with the Configuration Tool, click on the “Configuration” tab. You will require the following information in order to configure the device:

- Vessel’s name: limited to 20 characters
- Call sign: limited to 7 characters
- MMSI: Enter your MMSI (Maritime Mobile Service Identity) number
- Vessel type: choose your ship type from the drop down list
- Ship dimensions: Enter the vessel dimensions by appointing the position of your GPS antenna
- Configure NMEA 0183 Baud Rate: Baud rate of NMEA 0183 # 1 and NMEA 0183 # 2 can be configured here to 38400, 9600 or 4800.



WARNING: The MMSI number can only be entered once. Be sure to enter the correct MMSI number, as it cannot be corrected if entered incorrectly.

AIS Configuration Tool

Com Port: Disconnect

Configuration | GNS Status | Diagnostics | Other Vessels | Serial Data | Wi-Fi

Configure Vessel Details

Ship's Name:

Call Sign:

MMSI:

Vessel Type:

Ship Dimensions and GPS Antenna Location

A: m

B: m

C: m

D: m

Configure NMEA0183 Baud Rate

NMEA 1:

NMEA 2:

Advanced Configuration More...

Program Device

Figure 8 Static Data Setting

4 GET STARTED

4.1 Start up the Transponder

The transponder will start up whenever the connected power source is ON. It will operate automatically if the transponder has been properly configured using the Configuration Software and GPS/VHF antennas are also properly installed. Normally the transponder should transmit its own ship positions every 30 seconds or 3 minutes depending on the moving speed. It should also receive other vessels' information in the vicinity.

The operation status of the transponder can be checked from the LED lights on the unit. Description of the LED indications is provided in the following section.

4.2 LED Indicators

Indicator	Light	Description
Power	Green, steady	The transponder has been powered up correctly. By USB power the Power LED does not light showing that the transponder is in USB power mode.
	Red, steady	MMSI is not properly programmed
Error	Red, flashing	The transponder has detected a BIIT system error. Please refer to Chapter 4.5 Built-In Integrity Test for detailed explanation.
	Green, flashing	The transponder is receiving AIS data.
Tx/Silent	Orange, flashing	The transponder is acquiring a GPS fix, no AIS transmission during this time period. This can be the following situation: <ul style="list-style-type: none">• The device is just newly powered on and is acquiring a GPS position fix prior to transmitting its first vessel information report. This process may take several minutes.• The GPS position fix has been lost. The device is attempting to re-acquire position

Tx/Silent		fix for 30 minutes before entering a BIIT system error state.
	Orange, steady	The transponder is in silent mode, no AIS transmission at all.
	Green, flashing	The transponder is transmitting AIS data. The flash interval is 3 minutes when vessel speed under 2 knots. The flash interval is 30 seconds when vessel speed above 2 knots.
SD	Green, flashing	SD card is being accessed.
	Green, steady	SD card is full. Replace with another empty SD card or delete files to obtain free spaces.
Wi-Fi (108W only)	Green, flashing	The green LED indicates an active Wi-Fi traffic

4.3 SD Card Data Logging

The CAMINO-108 records voyage data onto a SD card in .txt format. The compatible SD card types are listed as followed:

- Standard “SD” with maximum 2GB size
- Standard “SDHC” with maximum 32GB size
- Supported data format: FAT12/16 by SD, FAT32 by SDHC

The log files have naming convention of AIS_XXXXXX.txt with increment from 000001 to 999999. Entry in the log file is vessel’s GPS sentence in IEC 61162 format.

The SD card is hot-swappable. Insert the SD card into the slot until the card is seated. When the transponder is powered on, it will commence logging voyage data and indicate the writing process by flashing the green SD LED indicator.

The device overwrites the oldest data when the storage space is full. Removing SD card from the transponder stops data logging immediately, and the SD LED will turn off.

It’s recommended to format your SD card regularly, e.g. every 1~3 month for optimal data integrity. Please save any data you wish to keep prior to formatting your memory card.

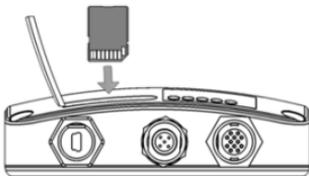


Figure 9 **Inserting SD memory card**

4.4 Wi-Fi Configuration (CAMINO-108W only)

Installation of Wi-Fi antenna is straight forward. Screw on the antenna firmly and then raise up the antenna.

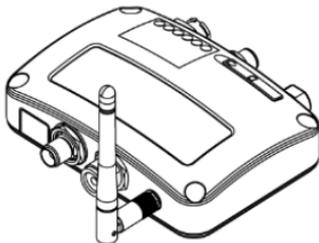


Figure 10 Transponder with Wi-Fi antenna connected

CAMINO-108W can work in Access Point Mode or Client Mode.

The information below details the information required for connecting the CAMINO-108W to another device using Wi-Fi.

4.4.1 Access Point Mode

CAMINO-108W is featured with powerful Wi-Fi performance supporting wireless connection with up to 32 mobile devices. After the configuration is done, press “Program Wi-Fi Module” to save the settings to the device.

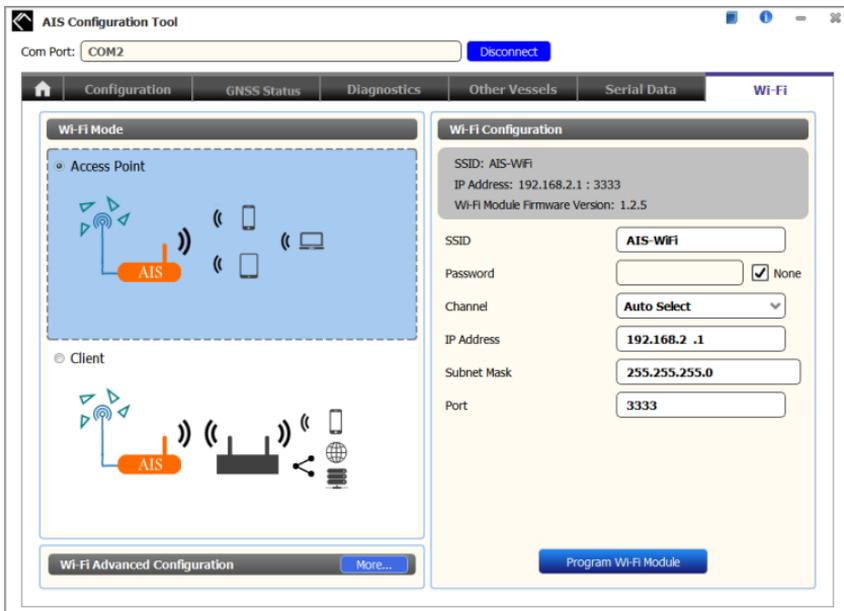


Figure 11 Access Point Mode

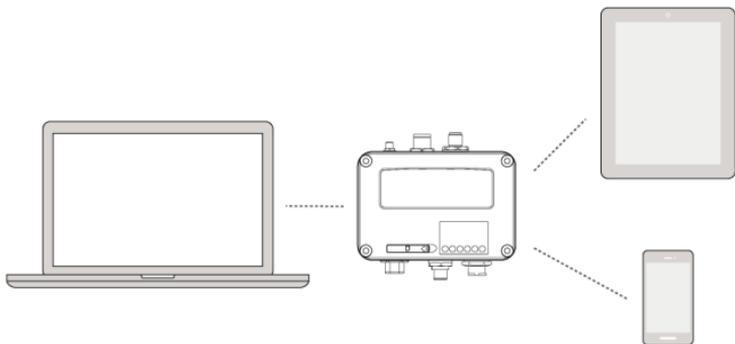


Figure 12 **Connect to mobile devices**

■ **SSID (Service Set Identifier):**

The SSID for the CAMINO-108W is AIS-WiFi. When another SSID is preferred, just input it in the SSID field and then press “Program Wi-Fi Module”.

■ **Password:**

By default the Wi-Fi network has no password. Users are allowed to create their own key with an alpha-numeric password between 8 and 63 characters long. The password can include symbols (!?*&_) and spaces.

- **System IP:**
Default system IP is **192.168.2.1**
User can create IP by inputting value in individual field.

- **Port:**
Default port is **3333**. User can set the port between 3000-65535.



Note: By default AMEC CAMINO-108W uses WPA2-Personal wireless security protocol.

4.4.2 Client Mode

CAMINO-108W is also able to join an existing Wi-Fi network. When clicking on „Client”, it can take up to 45 seconds until CAMINO-108 scans all available Wi-Fi networks.

Pick the network you want to join and enter the password and click on “Connect”.

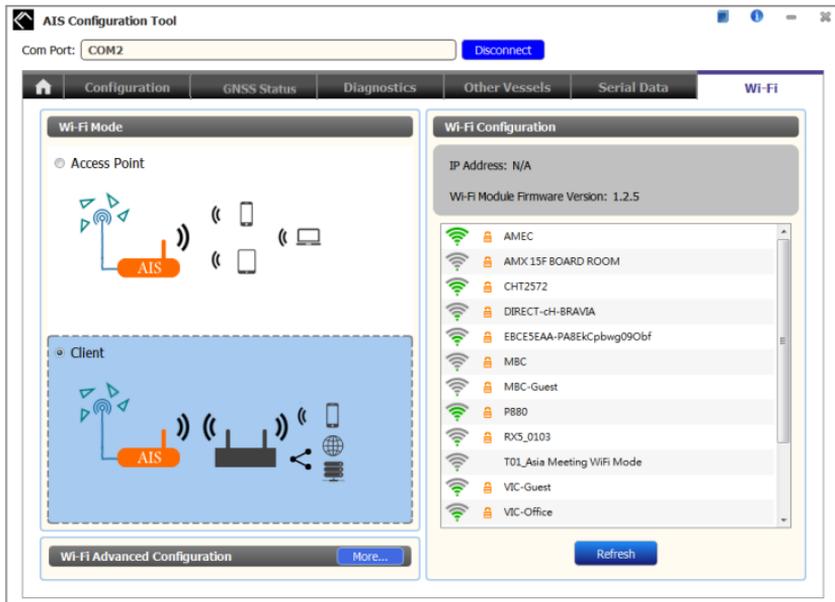


Figure 13 Client Mode

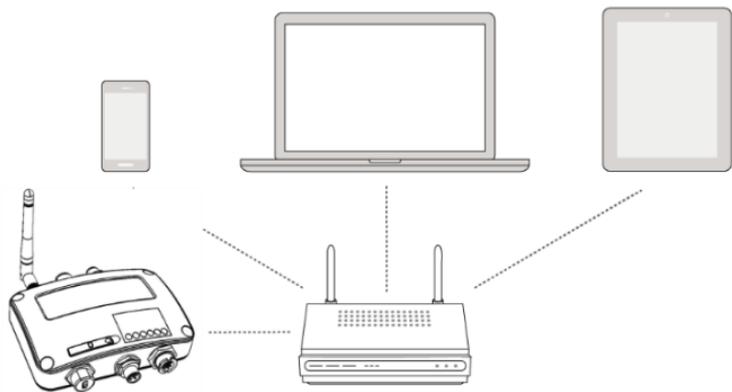


Figure 14 Join an existing Wi-Fi network

4.5 Built-in Integrity Test (BIIT)

With BIIT (Built in Integrity Test) function, the CAMINO-108 is constantly monitoring and testing the integrity of the AIS transponder. Should an abnormal condition be detected within the device, the Error LED will alert with flashing red light. Abnormal conditions may include situations like the followings:

- Antenna VSWR exceeding the maximum allowed level (Error LED flash)
- MMSI not set (Error LED steady on)
- Background noise level exceeds allowable threshold (-77dBm) (Error LED flash)
- GPS is unable to gain lock (3D fixed) after 30 minutes of losing GPS signal (Error LED flash)
- Low input power (< 8.6 V DC) (Error LED flash)

5 SPECIFICATIONS

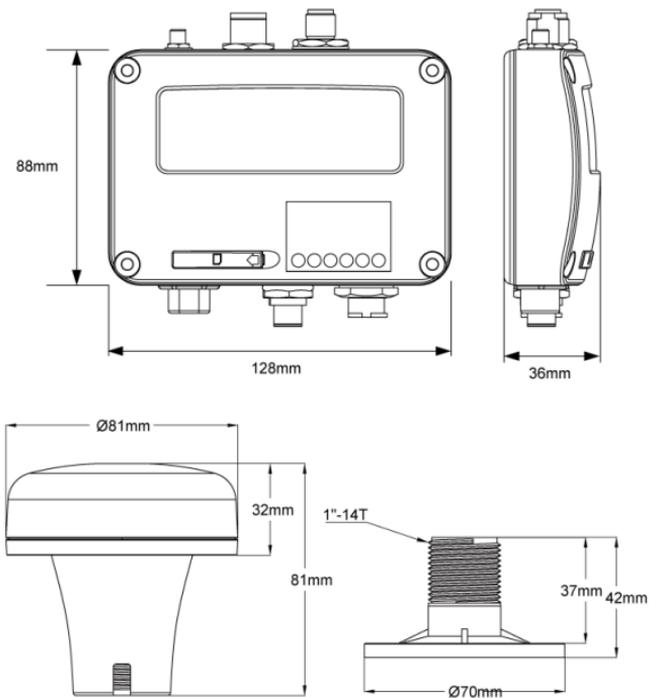
5.1 Product Specifications

APPLICABLE STANDARDS	
EN 301 489-1 V2.1.0 / EN 301 489-3 V2.1.0	IEC 60945 Ed. 4:2002
EN 301 489-1 V2.1.0 / EN 301 489-17 V3.1.0	IEC 62287-1 Ed. 3:2017
EN 301 843-1 V2.1.1 / EN 301 843-2 V2.1.1	IEC 61108-1 Ed. 2:2003
EN 300 328 V2.1.0	IEC 61162-1 Ed.4.0, 2010
EN 303 413 V1.1.1	IEC 61162-2 Ed.1.0, 1998
EN 62311:2008	ITU-R M.1371-5:2014
EN 62368-1:2014 + A11:2017	
VHF TRANSPONDER	
Frequency Range	156.025 MHz ~ 162.025 MHz
Channel Bandwidth	25 KHz
Modulation	GMSK / FM
Data Rate	9,600 bps
Number of AIS Transmitter	1
Number of AIS Receiver	2 (one time-shared between AIS and DSC)
Number of DSC Receiver	1 (time-shared between AIS and DSC)
AIS Channel 1	CH 87B (161.975 MHz)
AIS Channel 2	CH 88B (162.025 MHz)
Tx Power Output	2 Watt (33 dBm \pm 1.5 dB)
Rx Sensitivity	< -107 dBm @ 20% PER
DSC RECEIVER	
Modulation	1,300 Hz / 2,100 Hz FSK
Data Rate	1,200 bps \pm 30 ppm

Spurious Response Rejection	≥ 70 dB for signal @ -104 dBm; BER ≤ 1 %
Blocking	≥ 84 dB for signal @ -104 dBm; BER ≤ 1 %
GNSS RECEIVER (INTEGRATED)	
Receiving Channels	72 channels
Accuracy	IEC 61108-1 compliant
GNSS support: GPS & GLONASS (factory default)	
POWER SUPPLY	
Supply Voltage	12V / 24V DC, 2A
Power Consumption (108)	Typically less than 3W average @ 12V DC
Power Consumption (108W)	Typically less than 4W average @ 12V DC
CONNECTION INTERFACE	
GPS Antenna Connector	TNC (Female)
VHF Antenna Connector	SO-239 (Female)
NMEA 2000	Standard connector LEN=1
Silent Mode Setting	Set by the dedicated pins in the 12-pin cable
USB	Mini-B type, waterproof
NMEA 0183 (RS-422)	Support two NMEA 0183 interfaces Baud rate configurable (default 38,400 bps) Separate Tx/Rx baud rate Standard IEC 61162-1 / IEC 61162-2 sentences
Wireless Connection	IEEE 802.11 b/g/n (CAMINO-108W only)
ENVIRONMENTAL	
Operating Conditions	IEC 60945 "protected" category
Operating Temperature	-15°C ~ 55°C

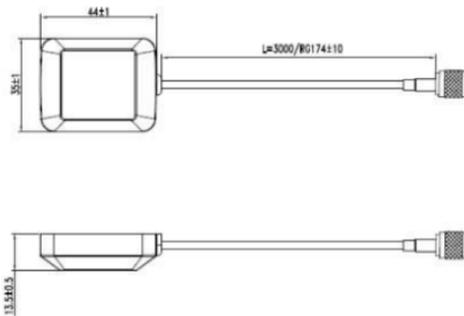
PHYSICAL	
Width	128 mm (5.04 inches)
Height	36 mm (1.42 inches)
Depth	88 mm (3.46 inches) (exclude connector)
Weight	250 g
AMEC AIS CLASS B CONFIGURATION (PC/Mac)	
AMEC AIS Configuration Tool	www.alltekmarine.com/support/download
Wi-Fi ANTENNA GAIN (108W ONLY)	
Tx Power Output	19.4 dBm EIRP
GA-22 GPS ANTENNA (OPTIONAL)	
Cable	integral 10m RG-174 cable plus mounting bracket
Supply Voltage	3.3V

5.2 Dimensions



(GPS antenna GA-22 is an optional item)

(Unit: mm)



(GPS antenna PA-02 is an optional item)

5.3 NMEA 2000 PGN Information

Transmit	
PGN	Description
59392	ISO Acknowledgment
59904	ISO Request
60928	ISO Address Claim
126464	PGN List - Transmit PGN's group function
126996	Product Information
129025	Position Rapid Update
129026	COG SOG Rapid Update
129029	GNSS Position Data
129038	AIS Class A Position Report
129039	AIS Class B Position Report
129040	AIS Class B Extended Position Report
129041	AIS Aids to Navigation (AtoN) Report
129539	GNSS DOPs
129540	GNSS Sats in View
129792	AIS DGNSS Broadcast Binary Message
129793	AIS UTC and Date Report
129794	AIS Class A Static and Voyage Related Data
129795	AIS Addressed Binary Message
129796	AIS Acknowledge
129797	AIS Binary Broadcast Message
129798	AIS SAR Aircraft Position Report
129800	AIS UTC/Date Inquiry

129801	AIS Addressed Safety Related Message
129802	AIS Safety Related Broadcast Message
129803	AIS Interrogation
129804	AIS Assignment Mode Command
129805	AIS Data Link Management Message
129806	AIS Channel Management
129807	AIS Group Assignment
129809	AIS Class B "CS" Static Data Report, Part A
129810	AIS Class B "CS" Static Data Report, Part B
Receive	
PGN	Description
59392	ISO Acknowledgment
59904	ISO Request
60928	ISO Address Claim
127250	Vessel Heading
127258	Magnetic Variation
129026	COG & SOG, Rapid Update
129029	GNSS Position Data
129539	GNSS DOPs

5.4 Supported NMEA 0183 Sentences

Transmit	
Sentence	Description
GGA	Global Positioning System Fix Data
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites In View
GLL	Geographic Position – Latitude/Longitude
RMC	Recommended Minimum Specific GNSS Data
VDO	AIS VHF Data-Link Own-Vessel Report
VDM	AIS VHF Data-link Message
Receive	
Sentence	Description
DTM	Datum Reference
GBS	GNSS Satellite Fault Detection
GSA	GNSS DOP and Active Satellites
HDT	Heading, True
RMC	Recommended Minimum Specific GNSS Data
ROT	Rate Of Turn

6 TROUBLESHOOTING

The transmitting LED (Green color) is not illuminated, why?

- The transmitting interval of a Class B transponder is 3 minutes if the speed of the vessel is less than 2 knots. If the speed exceeds 2 knots, the transmitting interval will be 30 seconds. For each transmission, the channel indicator will flash once quickly. The green light from the Tx indicator could be missed if not observed carefully.
- For AIS transmitting, GPS information from GPS antenna is required. Without GPS information, AIS will not transmit AIS signal. Please check if your GPS antenna is connected and setup correctly.

CAMINO-108 receives AIS signals normally, but no one in the surrounding can see me, why?

- AIS Class B transmission range limitation: an AIS Class B transponder transmitting range of 5-7 miles in perfect conditions. The AIS receiver in the transponder will typically see Class A vessels that are 20-30 miles away or even more in excellent conditions. The major reason is that all AIS Class B transponders transmit at 2 watts vs. the 12.5 watts that Class A transponders typically use. This difference in power impacts on the transmission range of each transponder type. For this reason, it is quite possible that Class A vessel can be seen, but Class B vessel might not be seen.
- VHF antennas interference: if you are using a dedicated AIS/VHF antenna for your transponder, be sure that it is placed at least 6 ft (1.83 m) away from other VHF antennas or vertical metal objects and ideally install the antenna on a different vertical plane from other VHF antennas. In several tests, mounting

two VHF antennas next to another typically reduces the transmitting range to both antennas by 50-70%.

- GPS is not fixed: If your GPS antenna is not connected or setup correctly, your transponder will see other vessels fine, but you will not be sending out your vessel position. All AIS transponders need a good GPS fix before it can send out any type of transmission. The color and state of the LEDs on the transponder indicate if the unit is in transmission mode or not.
- The location of VHF antenna is directly related to AIS transmitting range. The VHF antenna should be installed at mast as high as possible.

The silent mode (Tx off) on CAMINO-108 is not working, why?

- Silent mode can be configured on CAMINO-108 by using the wires at 12-pin connector.

Even though my CAMINO-108 is transmitting, why do some vessels with AIS take a long time to see my vessel name or not see it at all?

- AIS Class B users should keep in mind that Class B transponders do not broadcast position updates as often as Class A commercial transponders. As with Class B transponders, the full static information, such as vessel's names, the transmission is broadcasted every 6 minutes; however, MMSI and dynamic information, such as position, update will only be sent out every 3 minutes if the vessel is moving slower than 2 knots. To add to this, if the receiving party is using non-standard dual channel receiver (a single channel receiver), then in perfect conditions, the receiver will get your full static information every 12 minutes and your MMSI and dynamic information every 6 minutes if you are moored.

No data is being received by chart plotter, why?

- Please check that the power supply is connected correctly at CAMINO-108.
- Please check that the power supply is 12V or 24V with sufficient current capacity (no less than 2A).
- Please make sure that the connections between CAMINO-108 to the chart plotter are correct.

My MMSI is being received by other vessels but my vessel name is not shown on their chart plotter or PC, why?

- Older software and AIS displays may not be fully compatible with Class B transponders. In some of these cases, older equipments might only have Class B vessel show up on their displays with just MMSI number without the vessel name. This is usually due to the receiving device not knowing how to process the Message 24 static data from Class B transponders. Please contact the chart plotter maker and ask for software upgrades (for these older chart plotters) to resolve this issue.

The Red Error LED indication at CAMINO-108 is illuminated, why?

- The unit may not have a valid MMSI. Please check if the AIS transponder is correctly entered with a valid MMSI.
- Please make sure that both VHF and GPS antennas and their cables are working properly and not damaged.

Why is the Wi-Fi signal weak and how can I improve it?

- The router is too far from the client devices. To improve the Wi-Fi signal strength reallocated your Transponder to a more central location.

- There might be intervening barriers (e.g. a large expanse of metal) that is blocking the Wi-Fi signals. Relocate your Transponder to the center of the area where the client devices are placed, or to a position where the router and the devices are within a visible distance without interfering barrier.
- Nearby devices (e.g. microwaves/wireless phones) using the same frequency band may interfere with the router's 2.4GHz Wi-Fi transmission. To improve the Wi-Fi signal strength, try to avoid channel overlapping by reassigning their operation channels to channels 1, 6 or 11.

If you still encounter difficulties to set up or operate CAMINO-108 correctly, please email to service@alltekmarine.com for further instructions.

7 ABBREVIATIONS

AIS	Automatic Identification System
COG	Course Over Ground
CPA	Distance to Closest Point of Approach
CSTDMA	Carrier-Sense Time Division Multiple Access
DSC	Digital Selective Calling
ECS	Electronic Chart System
ETA	Estimated Time of Arrival
GPS	Global Positioning System
IMO	International Maritime Organization
MMSI	Maritime Mobile Service Identity
SOG	Speed Over Ground
TCPA	Time to Closest Point of Approach
TDMA	Time Division Multiple Access
TPI	Thread per Inch
UTC	Coordinated Universal Time
VHF	Very High Frequency
VTS	Vessel Traffic Services

8 FCC INTERFERENCE STATEMENT

NOTE: This equipment has been tested and found to comply with part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.

Any changes or modifications not expressly approved by AMEC for compliance could void of the user's authority to operate the equipment.

9 RF Exposure Warning

WARNING: This device generates and radiates RF electromagnetic energy and must be installed and operated according to the instructions contained in this manual. Failure to do so may result in product malfunction and/or exposure to potentially harmful levels of radio frequency radiation.

WARNING: Never operate this device unless it is properly connected to a VHF antenna. To maximize performance and minimize human exposure to RF energy, always mount the antenna at least 3m from the device.

The system has a Maximum Permissible Exposure (MPE) radius of 60 cm from VHF antenna, and 20cm from Wi-Fi antenna (CAMINO-108W only). This has been determined assuming the maximum power of the transmitter and using a standard half-wave monopole VHF antenna with a maximum gain of 3dBi and termination impedance of 50 ohms.

When installing the antenna and operating the equipment consider the following:

- The antenna should be mounted at a minimum vertical distance of 5m above the deck in order to meet international safety directives on Maximum Permissible Exposure (MPE). Failure to adhere to these limits could expose persons within the radius to RF radiation in excess of the recommended MPE limits.
- Higher gain VHF antennas will require a larger MPE radius.
- Do not operate the unit when anyone is within the MPE radius of the antenna.
- The antenna should not be co-located or operated in conjunction with any other transmitting antenna.

DECLARATION OF CONFORMITY

Hereby, Alltek Marine Electronics Corp. (AMEC) declares that this CAMINO-108/CAMINO-108W is in compliance with the essential requirements and other relevant provisions of Radio Equipment Directive (RED) 2014/53/EU.

A copy of the Declaration of Conformity can be obtained on-line from under "Download":

http://www.alltekmarine.com/products_detail.php?bgid=2&gid=41

Industry Canada Notice

This AIS class B digital device complies with Canadian ICES-003.

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

AMEC WORLDWIDE WARRANTY

Limited warranty

Subject to the terms, conditions and limitations set forth in this Worldwide Limited Warranty (hereinafter the “Warranty”), AMEC warrants that its products, when properly installed and used, will be free from defects in material and workmanship for a period of twelve (12) months, from the date of first purchase (the ‘Warranty Period’)

For the purposes of this warranty, ‘date of first purchase’ means the date that the product was purchased by the first retail customer, or by the institutional customer, or in the case of a product installed on a new vessel or any other marine related platform by a certified AMEC original equipment manufacturer (a ‘AMEC OEM’), the date that such vessel was purchased by the first retail customer.

AMEC will, at its sole option, repair or replace any defective products or components returned during the Warranty Period in accordance with the terms, conditions and limitations set forth below. Such repairs or replacement will be the sole remedy of the customer under this Warranty.

Standard Warranty Service

To qualify for standard warranty service the product must be returned to a AMEC-certified service agent (i) within the Warranty Period, and (ii) within thirty (30) days of the alleged product failure. Any products returned must be securely packaged and sent pre-paid and insured to AMEC or to a AMEC-certified service agent. All products returned must be accompanied by a copy of the original sales receipt to be eligible for standard warranty service.

Other conditions

This Warranty is fully transferable provided that you furnish the original proof of purchase to the AMEC -certified service agent. This Warranty is void if the seal label is removed or defaced.

THE LIABILITY OF AMEC TO A CUSTOMER UNDER THIS WARRANTY, WHETHER FOR BREACH OF CONTRACT, TORT, BREACH OF STATUTORY DUTY OR OTHERWISE SHALL IN NO EVENT EXCEED AN AMOUNT EQUAL TO THE TOTAL PURCHASE PRICE OF THE PRODUCT GIVING RISE TO SUCH LIABILITY AND IN NO EVENT SHALL AMEC BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES OR LOSS OF GOODWILL, REPUTATION, LOSS OF OPPORTUNITY OR INFORMATION, DATA, SOFTWARE OR APPLICATIONS.

In the event that any term or provision contained in this Warranty is found to be invalid, illegal or unenforceable by a court of competent jurisdiction, then such provision shall be deemed modified to the extent necessary to make such provision enforceable by such court, taking into account the intent of the parties.

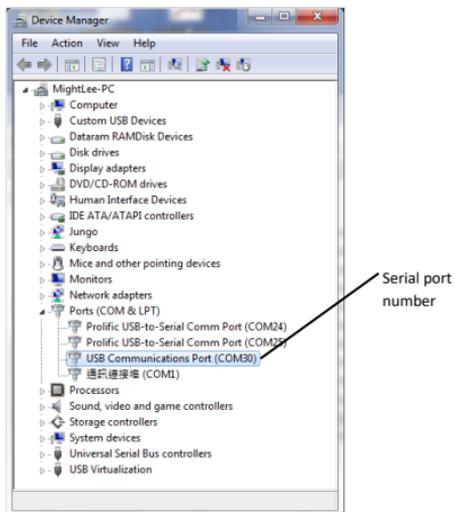
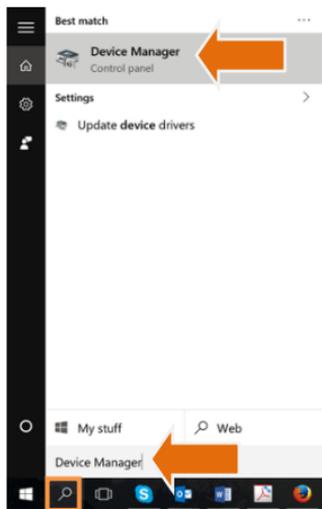
All AMEC products sold or provided hereunder are merely aids to navigation. It is the responsibility of the user to exercise discretion and proper navigational skill independent of any AMEC product.

Appendix: How to Determine Serial Port

If your PC/laptop does not have an available serial port, you may use a RS232-to-USB adapter. To find out the proper serial port for connection use the following instructions.

Windows 10 and Windows 11

Click Windows button + S and type Device Manager in the search box, then select Device Manager from the list of results. Expand the Ports (COM & LPT) and port number are presented with numerical number within a parenthesis in the following format (COMXX).



Alltek Marine Electronics Corporation

14F-2, No. 237, Sec. 1, Datong Rd.,
Xizhi Dist., New Taipei City, 22161, Taiwan

Tel: +886 2 8691 8568

Fax: +886 2 8691 9569

Email: service@alltekmarine.com

Website: www.alltekmarine.com