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Welcome to the world of AIS

Congratulations on your purchase of the SafePassageAIS® Dual-Band AIS Receiver. Significant research and engineering have gone into the creation of the SafePassage. With proper care and use, the SafePassage will improve your boating experience by making you more aware of nearby commercial ships and provide you in a timely manner with the information you need to safely navigate in and among them.

SafePassage AIS Limited Warranty

SeaCAS, LLC warrants this product to be free from defects in materials and craftsmanship for one year from the date of purchase. SeaCAS will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labor. In the event that an AIS receiver needs to be returned, please go to www.seacas.com or contact SeaCAS Customer Service at custsvc@seacas.com to obtain an RMA # and instructions for returning the unit. Any product sent to SeaCAS without an RMA # will be returned to the sender.

This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs. The above does not affect the statutory rights of the consumer.

Disclaimer: This product is designed to aid navigation and should be used to augment normal navigational procedures and practices. It is the user's responsibility to use this product prudently. Neither SeaCAS, LLC, its dealers nor its agents accept responsibility or liability either to the product user or their estate for any accident, loss, injury or damage whatsoever arising out of the use of this product.

Product Support

SeaCAS is pleased to offer unlimited free technical support. Support is available at www.seacas.com and by e-mail.

- Unlimited E-Mail - custsvc@seacas.com. E-mail support questions are usually answered within one business day.
Installation

SeaCAS provides support for most aspects of current SeaCAS products, such as installation and operation, during the first year of ownership.

Connection with Navigation System

SeaCAS can provide limited assistance with integrating SafePassage into your navigation software. However, it is highly recommended that an authorized and knowledgeable professional installs your SafePassage if it is to be integrated with your chart plotter or radar.

Networks

While your SafePassage can be integrated to your network through a Serial-to-Ethernet adapter, you must have a qualified network administrator to ensure that the network itself is fully operational.

Return Policy

Read the License Agreement for the complete return policy. In general, SeaCAS products purchased directly from SeaCAS come with a 30-day return policy, provided procedures are followed. Products purchased from dealers are subject to that company's return or exchange policy.

Warning: Every effort has been made to ensure that all information contained in this user guide is accurate. However, AIS is a new technology and related legislation and regulation is subject to change. If regulations change while this product is on the shelf, SeaCAS is not responsible for outdated content in this user guide. We advise you to take normal steps to ensure that the information is up to date and current. Your SafePassage will receive any AIS message that is broadcast on the two AIS channels, even those that have yet to be defined.

Hardware Installation

What is AIS?

AIS stands for Automatic Identification System. For improved safety, and specifically for collision avoidance reasons, you need to know the position, details and navigational intentions of commercial ships within VHF range using the AIS system.

IMO regulations require most commercial vessels worldwide to have Class “A” AIS transponders installed on their vessels. Class “A” transponders use VHF frequencies to:

- Transmit position and identification information of their own vessel
- Receive details from other vessels or navigation aids within VHF range.
SafePassage AIS

Unlike Class “A” transponders, SafePassage is an AIS receive-only unit, designed specifically for the small commercial, leisure, fishing vessel markets to listen to other vessel's AIS information and to information transmitted by AIS equipped aids to navigation (AtoN).

Once connected to either an on-board personal computer loaded with AIS-ready navigation software or to an AIS-ready chart plotter or radar, AIS data transmitted by ships and AtoN’s within range is plotted on the screen giving you a visual interpretation of other vessels and AtoN’s within VHF range.

SafePassage generates standard encapsulated AIS sentences according to the IEC61162-2/NMEA 0183 v3.01 specification but any not-yet-defined AIS messages will also be received and displayed on your navigation system if it has been updated to do so.

Information from Class “A” AIS transponders carried by most commercial vessels are transmitted at different rates ranging from 6 minutes to 2 seconds depending on navigation status, speed and rate of turn.

Information transmitted from vessels that have Class “A” AIS transponders on-board includes:

<table>
<thead>
<tr>
<th>• Name of Vessel</th>
<th>• Destination</th>
<th>• Size of Vessel</th>
<th>• Vessel Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Speed (SOG)</td>
<td>• Call Sign</td>
<td>• ETA</td>
<td>• Draft</td>
</tr>
<tr>
<td>• Position</td>
<td>• Course (COG)</td>
<td>• Type of Vessel</td>
<td>• Status</td>
</tr>
<tr>
<td>• MMSI Number</td>
<td>• Navigational Status</td>
<td>• Heading</td>
<td>• Cargo</td>
</tr>
</tbody>
</table>

Note: Not all of the above information is necessarily transmitted by each vessel.

To review the latest information regarding AIS compliance and the current status on different regulations surrounding AIS transponders, we recommend you visit www.uais.org/CarriageRequirements.htm.

The Contents of this Box

Before proceeding with your SafePassage installation, please check the contents of the box, which should include:

- The SafePassage Dual-Band Receiver and 4 mounting screws
• Integrated AIS & GPS Antenna (300-model only)
• GPS Antenna (150-model only)
• Cable #1 - Interface cable for direct connection to a PC’s USB port
• Cable #2 - Interface cable for serial connection to a Chart Plotter or a PC and to a DC power source
• Cable #3 – Coax Antenna Cable (300- and 150-Model only)
• CD with USB Drivers, Diagnostic Utility Software and other SafePassage Resources
• This User Guide
Installing SafePassage.

Choosing a Suitable Location to Install SafePassage
The AIS VHF antenna should be separated as far as possible from the voice VHF antenna to avoid unnecessary interference and to allow it to continue to receive AIS position updates while the voice VHF is used to transmit. The best separation is achieved by vertically separating the antennas or at least mounting them on opposite sides of the vessel. In addition, the VHF antenna should be mounted at least 3 meters away from—or at least out of the transmitting beam—of high-power transmitters such as radars or other VHF antenna installations. Once a location has been selected, mount your integrated AIS & GPS antenna (300-model only) or your AIS antenna on any standard 1”-14 marine antenna mount with a relative clear view of the horizon. Large obstructions that might shade the antenna should be avoided. The integrated AIS & GPS antenna also needs a clear view of the sky to receive GPS satellite transmissions. For the 150-model also mount the included GPS antenna on a standard 1”-14 mount with a clear view of the sky.

Tip: Mount your AIS antenna as high as possible; this will increase your range.

Mounting your SafePassage
Your SafePassage(see figure 1) is water-resistant but not watertight. Secure it to a suitable bulkhead or shelf. If you will be using a USB connection to your PC and the 3’ USB cable isn’t long enough, use a USB extension cable no longer than 5m (16’).

In addition, you should select a location away from excessive heat sources and free of high levels of vibration and shock. In addition, you should select a location away from excessive heat sources and free of high levels of vibration and shock.
After you have correctly mounted your SafePassage, you are ready to connect the cables.

**Step 1 - Wiring your SafePassage**

**WARNING:** Do not connect USB or power to your SafePassage 300-model without first connecting it to your integrated AIS & GPS antenna.

Your SafePassage comes with 2 short cables. You only need one of these cables to properly install the hardware. Review the options below to determine which cable you should use.

**Option #1 - Interface Cable for Direct USB Connection to PC or Mac Computer**

This cable has a USB Type “A” version 2.0 connector at one end of the cable. Use this cable if you plan to connect your SafePassage to your PC or Mac computer. Plug one end of the cable into the Data Connector on your SafePassage. Next, plug the other end into an available USB port on your computer. If you intend to use
a USB extension cable or a USB hub, make sure they have a power supply, as your SafePassage draws its power from the USB port.

Option #2 - Interface Cable for NMEA Connection to Chart Plotter or Radars
This package also contains a cable with a watertight Data Connector on one end and five separate bare wires. Use this connector if you want to connect your SafePassage to other AIS Information Displays such as Chart Plotters and Radars. If you use this cable, the following guide will help you make the connections.

<table>
<thead>
<tr>
<th>Wire Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS232</td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>White</td>
<td>NMEA Data In</td>
</tr>
<tr>
<td>Green</td>
<td>NMEA Data Out</td>
</tr>
<tr>
<td>Power</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>Power Ground</td>
</tr>
<tr>
<td>Red</td>
<td>12-volt DC</td>
</tr>
</tbody>
</table>

The green “NMEA Out” output data is NMEA AIS (!AIVDM text strings) and proprietary SeaCAS ($PSCS text strings) at 38.4 kbps. The 300- and 150-models also output GPS ($GP text strings) at 38.4 kbps via the green “NMEA Out” wire. Connect the red power lead to a 12-Volt DC supply.

**Tip:** This should be connected to a breaker/switch panel preferably with a fuse rated at 0.5 amps. Pin connections are shown below.

<table>
<thead>
<tr>
<th>Power Cable</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin #</td>
<td>Wire Color</td>
<td>Function</td>
</tr>
<tr>
<td>8</td>
<td>Black</td>
<td>Negative (Ground)</td>
</tr>
<tr>
<td>10</td>
<td>Red</td>
<td>Positive (+12 VDC)</td>
</tr>
</tbody>
</table>
Step 2 - Wiring the antenna to your SafePassage

- **300-model** Run the 10-meter coax cable between your SafePassage and the integrated AIS & GPS antenna. If you need a longer cable, then replace the 10-meter cable that came with your SafePassage with a RG213 coax cable up to 30-meters in length and solder on male TNC connectors at each end. You can also purchase a 20-meter cable or a 30-meter coax cable from SeaCAS at www.seacas.com.

- **150-model** Run the 10-meter coax cable between your SafePassage’s small (SMA) connector and the GPS antenna. Purchase an AIS\(^1\) antenna and cable and connect it with the larger TNC connector on your SafePassage.

- **100-model** Purchase an AIS\(^1\) antenna and cable and connect it with the TNC connector on your SafePassage.

Your SafePassage should now be properly wired and ready to receive AIS broadcasts from other vessels and position fixes from GPS satellites (300- and 150-model only). To configure your navigation program, chart plotter or radar to display AIS information please refer to its documentation or go to either the “SeaCAS User Community Knowledge Base” or the “Frequently Asked Questions” (FAQ) in the “Support” section at http://www.seacas.com/.

Step 3 – Loading the USB Driver

**Note:** This step is not necessary if you intend to use only the serial connection.

This step may also be skipped when the USB connection is used in Windows XP, since it already has a generic USB serial driver that works with SafePassage’s USB port.

\(^1\) While a regular VHF antenna isn’t tuned to the AIS frequency (162 MHz) it usually works to receive AIS.
If you find that your computer does not have an appropriate USB driver then proceed with the following steps.

- If a USB Serial Port of the same type has been previously installed on your machine and the “Virtual Com Port” (VCP) drivers that are about to be installed are different from those already installed, the original drivers need to be uninstalled.
- Download the latest available USB Drivers from the SeaCAS website “Support” section (“Driver Downloads”) or find the “USB Drivers” (*.zip format) file on the CD that came with your SafePassage and unzip driver files to a new folder (“VCP Drivers”) on your PC.
- Connect your SafePassage to a spare USB port on your PC. This will launch the Windows Found New Hardware Wizard. If there is no available Internet connection, Windows will display the screen shown in Figure 2.

![Figure 2](image)

Select "No, not this time" from the options available and then click "Next" to proceed with the installation. If there is an available Internet connection, Windows XP will silently connect to the Windows Update website and install any suitable driver it finds for the device in preference to the driver manually selected.
Select "Install from a list or specific location (Advanced)" as shown in Figure 3 and then click "Next".

Select "Search for the best driver in these locations" and click on the browse button and browse to the folder that contains the unzipped driver files ("C:\VCP Drivers" in Figure 4). Once the file path to this folder has been entered in the box, click "Next" to proceed.
The screen in Figure 5 will be displayed as Windows XP copies the required driver files.

Figure 5

Figure 6
- Windows should then display a message indicating that the installation was successful (see Figure 6). Click "Finish" to complete the installation. The serial converter driver has now been installed. The COM port emulation driver must be installed next.
- After clicking "Finish", the Found New Hardware Wizard will continue by installing the COM port emulation driver. The procedure is the same as that above for installing the serial converter driver.
- Open the Device Manager (located in "Control Panel\System" then select the "Hardware" tab and click "Device Manager") and select "View > Devices by Type". The device appears as an additional COM port with the label "USB Serial Port (COM4)".

![Device Manager]

Figure 7
Step 4 - Check LED's on your SafePassage

Your SafePassage has 4 Light Emitting Diodes (LED's). See Figure 8: (100-model doesn’t have a GPS LED)

- The green power light should be solid.
- The yellow GPS light will show a long flash followed by a number of short flashes. The number of short flashes indicates the number of satellites it uses to get a position fix. (300- and 150-models only).
- The red lights flash when AIS messages are being received on channel “A” or “B”, respectively.
Step 5 – Testing Proper Operation of Your SafePassage

How do I test that my SafePassage is working properly?

1. Connect your SafePassage with a PC computer or laptop using the USB or the Serial Connector. If you use a serial connection, make sure SafePassage is being powered.

2. Right-click on the “My Computer” Icon on your desktop and select “Properties”.

![My Computer Icon with Properties Option](image9.png)
1 Click on the “Hardware” Tab and then on “Device Manager”

![System Properties](image)

Figure 10

1 Determine which COM port is connected with your SafePassage. (SafePassage is connected through Serial Communications Port COM1 in this example)
1. Install the “SeaCAS Diagnostic Utility” on your PC either by downloading it from www.seacas.com (or by inserting the SeaCAS CD in your CD ROM Drive and selecting “SeaCAS Utility Software”).
   - Type www.seacas.com in the address bar of your browser.
   - If you haven’t registered yourself and your SafePassage yet, please do so first by clicking on “Register” on the left side of the screen.
   - If you have already registered click on “Support” on the left side of the screen.

   ![Figure 11](image)

   **For Customers and Dealers, Log in here to gain access to your account.**

   Signing in gives you access to:
   - Account information
   - Order Status
   - Software Downloads
   - FAQ’s
   - SeaCAS’ User Community’s Knowledge base
   - Installation Instructions
   - Owner Manuals

   ![Login Form]

   If you don’t have a password please register

   ![Password Reminder]

   - In the “Support” section, click on “SeaCAS Diagnostic Utility Download”
My Account Information

Product Registration
  ➡️ Product Registration

Registered Products
  ➡️ SafePassage AIS USB

Support
  ➡️ SeaCAS Users Knowledge Base
  ➡️ FAQ
  ➡️ Installation Instructions
  ➡️ Manuals
  ➡️ Driver Downloads
  ➡️ Software Upgrades
  ➡️ SeaCAS Diagnostic Utility Download
o Save the SeaCasUtility.exe file to a convenient folder on your PC’s hard disk:

Figure 12
○ Using Windows Explorer, open the folder that contains the just saved (SeaCASUtility in Figure 13) and click on “SeaCasUtility.exe”:

![Image of SeaCASUtility]

Figure 13

○ Follow directions on the screen in Figure 14. When installation is complete, click “Close”:

![Image of SafePassage Utility Software]

Figure 14
- Start SafePassage Diagnostic Utility:

Figure 15
Select the COM port that is connected with SafePassage:

![SafePassage Diagnostics Utility](image)

Figure 16

Then, in the “Capture Text” section, check the box labeled “Save To File” and click on the “Open” button.
Figure 17

- Make sure SafePassage is powered (Green LED is on) and record at least 3 minutes worth of output in the SafePassage.txt file.
After 3 minutes click on the “Exit” button. Then E-mail the SafePassage.txt file to custsvc@seacas.com or print it out and fax it to +1-206-600-1768. Please provide the SafePassage Serial Number and your contact information in your e-mail or fax. The SafePassage.txt file can be found in: C:\Program Files\SeaCAS\SafePassage.txt where “C” is your hard drive (substitute “D” or another letter for other configurations).
Technical Specifications

SafePassage is a dual-band AIS receiver

Electrical
Power supply range: 12 volts DC direct or 5V from USB
Power consumption: 240mW

Output
Baud rate: 38400 Baud (38.4Kb)
Format: IEC 61162-2/ NMEA 0183 v3.01
Output messages:
- AIS: All !AVDM messages, $PSCS proprietary SeaCAS messages
- GPS (300- and 150-model only):
  $GPGGA,$GPGLL,$GPRMC,$GPVTG,$GPZDA

AIS Receivers
Frequency: 161.975 MHz and 162.025 MHz
Channel spacing: 25KHz
Sensitivity: -107dBm
Demodulation: GMSK
Data Rate: 9600 each channel

dGPS Receiver (300- and 150-model only)
16-channel dGPS
WAAS and EGNOS enabled
Differentially corrected through AIS message 17

Physical Dimensions:
- SafePassageAIS all models: Length: 203 mm, Height: 30 mm, Width: 90 mm, Weight 450 g.
- Integrated AIS & GPS antenna: Length: 1300 mm, Base Diameter 65 mm, Weight: 1224 g.
- 150-model GPS Antenna: Diameter 130 mm, Height 74 mm, Weight: 220 g.

Connectors:
- All Models: USB Version 2.0 Type “A” Connector
- 300-Model: TNC for integrated AIS & GPS Antenna
- 150-Model: TNC for AIS antenna, SMA for GPS antenna
- 100-Model: TNC for AIS Antenna
Coax Cable
- **300-Model**: 10 m RG58 AU with male TNC connector at each end. For longer lengths, replace with RG213 (maximum length: 30 meters) or purchase a 20 m RG8X or 30 m RG213 cable with male TNC connectors at [www.seacas.com](http://www.seacas.com)
- **150-Model**: 10 m RG58 AU for the GPS antenna with a male SMA connector on one end and a male TNC connector on the other end.
- **100-Model**: None included.

Proprietary Messages
SafePassage generates a number of proprietary messages

<table>
<thead>
<tr>
<th>SeaCAS Mnemonic</th>
<th>Message ID</th>
<th>Description</th>
<th>Check sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>$PSCS</td>
<td>01</td>
<td>Manufacturer name (“SeaCAS”)</td>
<td>Product name (“SafePassage AIS”)</td>
</tr>
<tr>
<td>$PSCS</td>
<td>02</td>
<td>Product description (“Dual-Band AIS Receiver”)</td>
<td></td>
</tr>
<tr>
<td>$PSCS</td>
<td>05</td>
<td>Serial Number (“162038”)</td>
<td></td>
</tr>
<tr>
<td>$PSCS</td>
<td>06</td>
<td>DSP Software Build</td>
<td>FPGA Software Build</td>
</tr>
<tr>
<td>$PSCS</td>
<td>10</td>
<td>Channel (“A”) Reception Statistics</td>
<td></td>
</tr>
<tr>
<td>$PSCS</td>
<td>10</td>
<td>Channel (“B”) Reception Statistics</td>
<td></td>
</tr>
<tr>
<td>$PSCS</td>
<td>20</td>
<td>Channel (“A”) Reception Diagnostics Reserved for Manufacturer's Usage</td>
<td></td>
</tr>
<tr>
<td>$PSCS</td>
<td>20</td>
<td>Channel (“B”) Reception Diagnostics Reserved for Manufacturer's Usage</td>
<td></td>
</tr>
</tbody>
</table>
Your SafePassage generates these messages in sequence at a rate of one message per 12 seconds.
*Reception Statistics messages are output at one message per channel per 2 seconds

Sample output of proprietary messages:
$PSCS,01,SeaCAS,SafePassageAIS*20
$PSCS,02,Dual-Band AIS Receiver*4D
$PSCS,05,162038*1A
$PSCS,10,A,0,0*53
$PSCS,10,B,0,0*50
$PSCS,20,A,10,6,0,1,3,585000,1*40
$PSCS,20,B,12,10,0,2,0,594000,1*76

**Reception Statistics**
Proprietary Message 10 ($PSCS,10) is used to report VHF Data Link (VDL) message statistics. They are graphically shown in the SeaCAS Utility.

Format: $PSCS,10,ch,activity rate,extraction rate*chksum

Where
- PSCS - SeaCAS Proprietary Message mnemonic
- 10 - Message Id
- Ch - "A" or "B": AIS Channel Identifier
- Activity Rate - Range from 0->100: Indication of AIS Channel activity level presented as a log scale percentage of AIS TDMA slot utilization.
- Extraction Rate - Range from 0->100: Indication of AIS receiver performance level presented as a percentage of successful AIS transmissions extracted relative to channel activity.
- *chksum - proprietary message checksum

**Troubleshooting**

Frequently Asked Questions

Q: My SafePassage is plugged into my AIS Information Display Device, but I am not picking up any targets. What could be wrong?
A: Make sure that all your cables are connected properly and that power is coming into the receiver (Green LED on Signal Converter). If you have power, you should also make sure that you have correctly configured your Navigation System or Radar to operate with the AIS receiver. If all cables are connected properly and you use the USB cable you may want to make sure you have
properly installed the USB Driver. If you are using the Serial IEC61162/NMEA 0183 v3.01 connection you may want to check that the wires for the NMEA connection are properly connected with your chart plotter or radar.

Q: I was tracking a target on my screen and it suddenly disappeared. What happened to it?

A: Target data is broadcast, typically, at expected intervals. When your navigation system hasn't received an updated message from an AIS target for a period of time, the target will move into an "unknown" state before leaving the screen altogether. However, if you experience lost targets on a consistent basis, please contact SeaCAS Customer Service for further information.

Q: I'm not seeing any AIS targets on-screen. What's wrong?

A: If you have properly configured and installed both the hardware as well as navigation software, chart plotter or radar (sold separately), it may be that there are no AIS-carrying vessels within range.