Installation
and
Instruction Guide

CSB200
Class B AIS Transponder

Table of Contents

GENERAL WARNINGS

Comar Systems Ltd is not responsible for damages or injuries caused by your use of or inability to use the CSB200 correctly. The CSB200 is intended for use only by persons trained in navigation and only as a navigational aid, not as the sole method of navigation

All marine Automatic Identification System (AIS) units utilise a satellite based system such as the Global Positioning Satellite (GPS) network or the Global Navigation Satellite System (GLONASS) network to determine position.

The accuracy of these networks 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.

It is desirable wherever possible therefore to verify both your vessel's AIS derived position data and other vessels AIS derived position data with visual or radar based observations.

The compass safe distance of this unit is 1m or greater for 0.3° deviation.

DECLARATION OF CONFORMITY

Hereby, Comar Systems Ltd of Vittlefields Technology Centre, Forest Road, Newport, Isle of Wight, PO30 4LY, United Kingdom, declare that this CSB200 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

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

CE 0168 ⓘ

This product is intended for sale in the following member states:

Intended Country of Use:			
■ GB	■ FR	■ ES	■ SE
■ AT	■ NL	■ PT	■ DK
■ NO	■ BE	■ IT	■ FI
■ IE	■ LU	■ GR	■ CH

LICENCING

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

Please contact the relevant authority in your country for more information.

In accordance with a policy of continual development and product improvement the CSB200 hardware and software may be upgraded from time to time and future versions of the CSB200 may therefore not correspond exactly with this manual.

When necessary upgrades to the product will be accompanied by updates or addenda to this manual.

Please take time to read this manual carefully and to understand its contents fully so that you can install and operate your AIS system correctly.

Information contained in this manual is liable to change without notice.

Comar Systems Ltd disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

INTRODUCTION

Automatic Identification Systems (AIS)

How AIS Works

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 craft. Position is derived from a Global Navigation Satellite System (GNSS) network and communication between vessels is by Very High Frequency (VHF) digital transmissions. A sophisticated and automatic method of time sharing the radio channel is used to ensure that even where a large number of vessels are in one location blocking of individual transmissions is minimised, any degradation of the expected position reporting interval is indicated to the user and even if the unit suffers extreme channel overload conditions it will always recover to normal operation.

AIS Classes

There are two classes of AIS unit fitted to vessels, Class A and Class B. In addition AIS base stations may be employed by the Coastguard, port authorities and other authorised bodies. AIS units acting as aids to navigation (A to Ns) can also be fitted to fixed and floating navigation markers such as channel markers and buoys.

Class A units are a mandatory fit under the safety of life at sea (SOLAS) convention to vessels above 300 gross tons or which carry more than 11 passengers in International waters. Many other commercial vessels and some leisure craft also fit Class A units.

Class B units are currently not a mandatory fit but authorities in several parts of the world are considering this. Class B units are designed for fitting in vessels which do not fall into the mandatory Class A fit category.

The CSB200 is a Class B unit

INSTALLING THE CSB200 UNIT

Packing List

1 x CSB200 Transponder unit

1 x Power Cable

1 x PC 9pin D Male to Female Programming cable

1 x 9pin D Male Plug with wire ends.

1 x CD

1 x Instruction Manual

WARNING: Do not connect the CSB200 unit to a mains (line) AC electrical supply, as an electric shock or fire hazard could result.

CAUTION: Do not connect the CSB200 unit to a DC supply exceeding 15.6 V or reverse the supply polarity. Damage to the unit may result.

CAUTION: The CSB200 unit is designed for operation in the temperature range -25 °C to +55 °C. Do not install (or use) the CSB200 unit in environments which exceed this range.

CAUTION: The CSB200 unit should be installed in a location where it is protected from water and spray.

Electrical Connections

Connect a 12V DC supply (9.6-15.6V) capable of supplying 2A peak to the DC power lead.

Positive = RED Negative = BLACK

The case of the unit is not isolated from the negative terminal of the supply and therefore it is recommended that the unit is not attached to metal parts of the vessel.

GPS Antenna

The GPS antenna used must be of the active type (i.e. it should incorporate an LNA) and must be suitable for marine shipboard applications (index of protection, ruggedness, means of mounting, etc.). An antenna should be selected with a gain (in dB) depending on the length of cable between the antenna and the AIS unit; after subtraction of cable and connector losses a minimum total gain of 25 dB should be available at the CSB200 unit GPS antenna connector.

The GPS antenna to be used for AIS use must be a dedicated antenna, i.e. not shared with any other GPS receiver.

Installation of the GPS antenna is critical for the performance of the built in GPS receiver which is used for timing of the transmitted time slots and for the supply of navigational information should the main navigational GPS fail. We strongly recommend that:

1. The GPS antenna is mounted in an elevated position and free of shadow effect from the ship's superstructure.
2. The GPS antenna has a free view through 360 degrees with a vertical angle of 5 to 90 degrees above the horizon.
3. As the received GPS signal is very sensitive to noise and interference generated by other onboard transmitters, ensure that the GNSS antenna is placed as far away as possible from radar, Inmarsat and Iridium transmitters and ensure the GPS antenna is free from direct view of the radar and the Inmarsat beam.
4. It is also important that the MF/HF and other VHF transmitter antennas are kept as far away as possible from the GNSS antenna. It is good practice never to install a GNSS antenna within a radius of 5 meters from these antennas.

VHF antenna for AIS use

The VHF antenna employed for AIS use:

- Must be a dedicated antenna, i.e. not shared with any other VHF transmitter/receiver.
- Must be suitable for marine shipboard applications (index of protection, ruggedness, means of mounting, etc.)
- Should be omni-directional and vertically polarised with unity gain (0 dB) with a bandwidth sufficient to maintain VSWR <1.5 over the frequency range 156 – 163 MHz. As a minimum the 3dB

bandwidth must cover the two AIS channels and the DSC Channel.

- Should be mounted with at least a two metre vertical separation distance from any other VHF antenna used for speech or DCS communication.

WARNINGS

VHF Antenna Connection

Connecting a badly mismatched VHF antenna, leaving the VHF antenna port disconnected, or shorting the VHF antenna port will activate the VSWR alarm, cause the unit to stop sending position reports or cause damage to the transponder.

Radio Frequency Exposure

To meet the requirements for Radio Frequency Exposure it is necessary to install the VHF antenna correctly and operate the AIS equipment according to the instructions.

The VHF antenna must be mounted at a minimum distance (vertical separation) of 3 metres from the head of any person standing on deck in order to meet international safety directives on Maximum Permissible Exposure (MPE) / Specific Absorption Rate (SAR).

Where no suitable structure exists to achieve a 3 metre vertical separation then the antenna base must be mounted at least 1 metre above the head of any person within range, all persons should stay outside the 3-metre safety radius and if practical a grounded RF shield should be interposed between people and the antenna.

Failure to adhere to these limits could expose persons within the 3 metre radius to RF radiation in excess of the MPE / SAR limits.

PROGRAMMING THE TRANSPONDER

aisPRO Program

Before the CSB200 can transmit it requires to be programmed with your own vessels information. This is done via the CSB200 field programmer aisPRO2

This software is designed to be installed on a PC running Windows, and to use the programming lead provided as standard with the CSB200 unit. If the PC being used for programming does not have a 9-pin serial port then a commercially available USB to serial adaptor may be required. This connects between the supplied data lead and the PC.

The programming process operates as follows:

- A data record is created for an individual CSB200
- The CSB200 unit is then programmed
- If required the programming can then be checked by 'reading' the CSB200

The CSB200 personalisation data required is the ship's MMSI number, the name, its dimensions, position reference, type and call sign.

Programming the CSB200

- Connect the CSB200 to a suitable 12VDC Power supply and to the PC with the programming cable
- Install the program from the CD onto your PC
- Once the program is running select "Static Display" if not already shown
- Enter the Ships Name, Radio Callsign, Dimensions and Type of Vessel in the boxes provided
- Enter the ships MMSI number, **WARNING,** this number can only be programmed into the unit once, ensure it is correct
- Check the details are correct then click " Send Static data to AIS", a warning box will appear asking you to confirm that the MMSI number is correct, press OK if correct, the unit is now programmed. In the event that you have inadvertently entered the

incorrect MMSI number this can only now be changed by an authorised dealer, other information can be altered as required

Program Utilities

Additional screens are available from the menus to monitor the operation of the unit.

- **GPS Status:** Displays the signal levels of reception from individual satellites, green indicating locked and in use
- **Diagnostics:** Displays the operational status of the unit
- **Serial Data**: Allows you to monitor the output port of the unit
- **Software Update:** For future internal program updates, or enhancements of the unit which may occur

USING THE TRANSPONDER

Switching on

When the 12VDC supply is switched on the green ON LED will light and the other six LED's visible on the front panel of the unit will illuminate twice for a period of one second on each illumination. The Status, Error, TX Off and TX LEDs will then go out. The green RX LED will flash when it is receiving data from other AIS units. When the internal GPS is locked the yellow LED will go out and the green Status Led will light; note that this process may take up to 30 minutes depending on the switch-on state of the GPS receiver. The red TX LED will flash momentarily every time the unit transmits.

Warning and Fault States

If the unit has not been able to transmit a position report during the last expected two reporting intervals (i.e. the nominal reporting interval cannot be maintained for operational reasons such as a Message 23 quiet period, high channel load conditions, etc) the yellow LED will illuminate. This is a **warning condition only** and indicates that your vessels position is not currently being reported to other vessels. Reception of other vessel AIS information by the CSB200 is not affected. When the unit is able to commence reporting the yellow LED goes out.

If a fault occurs the red Error LED will illuminate. This may illuminate briefly if the power supply is interrupted or if the VHF antenna characteristics are briefly affected.

If the Red Error LED illuminates continuously the unit should be assumed to be faulty and should either be switched off (power removed) or if this is not practical any other vessel position information derived from the unit should not be used and it should also be assumed that the unit is not transmitting valid position information for your vessel.

The unit should be examined by an authorised service agent at the earliest opportunity.

More details on LED indications can be found in the Operation section of this manual.

Data Port Messages

The data port will output the following:

- (At power-up) boot-loader and main application splash text screens including version numbers, and memory status
- Details of relevant AIS transmissions received
- Details of AIS transmissions sent
- Details of channel management messages received
- Alarm messages generated by the BIIT function

The data port will accept the following inputs:

- Programming information
- Alarm acknowledgements

Please see the 'Data Interface' section of this manual for more details of the data port messages.

When in operation an AIS unit:

- Uses one of two VHF channels within the international marine band allocation (channel 87B; 161.975MHz, or channel 88B; 162.025MHz) to regularly transmit information such as the vessel position, Maritime Mobile Service Identity (MMSI), name, speed, course, etc.
- Receives similar information from other AIS equipped vessels within VHF range and outputs that information for use by an external display medium (AIS enabled chart plotter, PC using AIS enabled chart plotter software etc.)

Information Transmitted and Received

A Class A unit will transmit its IMO number (if known), MMSI, Call sign and Name, length and beam, ship type, time, course over ground (COG), speed over ground (SOG), heading, navigational status, rate of turn, draught, cargo type, destination and safety related messages via a short message service (SMS) facility. Message lengths are variable with static and voyage related information being transmitted less often.

A Class B unit will transmit its MMSI, Call Sign and Name, length and beam, ship type, time, course over ground (COG), speed over ground (SOG) and heading.

Built in Test

The CSB200 is equipped with Built In Integrity Testing (BIIT). BIIT tests run continuously or at appropriate intervals simultaneously with the standard functions of the equipment. The BIIT detects any failure or malfunction that will significantly reduce integrity or stop operation of the CSB200 unit.

The tests include:

- AIS TX malfunction (synthesiser not locked and TX time-out not exceeded)
- Antenna VSWR exceeds limit
- Rx channel 1 malfunction (synthesiser not locked)
- Rx channel 2 malfunction (synthesiser not locked)
- Internal GNSS not in use
- No valid SOG information
- No valid COG information
- Background noise > -77dBm
- GPS failure
- VSWR exceeding the maximum allowed level
- The input voltage is out of the specified range

LED Indicators

ON

This is a green LED which indicates, when lit, that power has been connected correctly to the transponder.

Status

This is a green LED which indicates, when lit, that the transponder hardware has been configured, that the operating software is present, that the CPU has booted up, the application software is running and everything is correct.

RX

This is a green LED which indicates when flashing that the CSB200 is receiving data from other AIS transponders and is outputting this data as VDM NMEA sentences on the output data ports. If the Green LED is on continuously the unit has not been programmed with its personalised data, it will still send received data to the output port but will not transmit.

TX

This is a red LED which flashes momentarily when the CSB200 transmits its own AIS data.

Timeout

This is a yellow LED which indicates when lit that the transmitter is prevented from transmitting. Reasons for this include the following:

- The transponder's internal GPS receiver is not operating or is not yet ready
- The transponder was unable to transmit an AIS message due to the channel being already occupied, e.g. by transmissions from other AIS transponders, or the TX Off function is in operation

Error

This is a red LED which indicates, when lit, one of the following status conditions is possible:

- Transmitter lockout timer (1 second maximum) has operated
- GPS is unable to gain lock after 30 minutes
- VHF antenna VSWR is out of range
- Power Supply is out of range
- Background noise level is above the threshold level (-77dBm)

TX Off

This is a Blue LED which indicates that the remote TX Off switch has been operated to manually stop the CSB200 transmitting data.

MAINTENANCE

WARNING: Unauthorized opening of the CSB200 unit will invalidate the warranty.

CAUTION: Avoid using chemical solvents to clean the CBS200; solvents may damage the case material.

NOTE: The CSB200 contains no serviceable parts. Contact your local Dealer if the unit fails to function correctly.

SERIAL DATA INTERFACE

Data Connection

If an external display unit is to be used to show other AIS units within range (such as a chart plotter, PC serial terminal or other display device) connect the user end of the data interface cable to the display device. Note that the software in the display device must be configured for AIS operation.

There is a 9-way D-type female connector mounted at the rear of the CSB200. The standard wire ended data cable assembly provided mates with this connector.

9 Pin D	Cable Colour	Signal Name
1	BROWN	-NMEA Output (RS422)
2	RED	+RS232 Output
3	ORANGE	+RS232 Input
4	YELLOW	+NMEA Output (RS422)
5	GREEN	Ground
6	BLUE	TX Off Switch +
7	VIOLET	Not Used
8	GREY	+NMEA Input (RS422)
9	BLACK	-NMEA Input (RS422)

Connections to a PC

CSB200	PC 9 Pin Serial Port
2- Red -TX Data	2- RX Data
3- Orange- RX Data	3- Transmit Data
5 –Green-Ground	5 -Ground

Connections to a Plotter

CSB200	Plotter/Radar
1 – Brown- NMEA Output B	NMEA Input B- Return
4 – Yellow NMEA Output A	NMEA Input A - Positive

Transmit Off facility

The transmit off facility is provided in the event that you do not wish to disclose your position to other users or to conserve power when it is not necessary to transmit your position.

The transmitter can be turned off by connecting a simple switch between the Blue cable on pin 6 and the Green cable on pin 5. Closing this switch will cause the Blue-TX off LED and the Yellow Timeout LED to light, the Green Status LED will extinguish. Opening the switch will resume transmissions. Reception of AIS data during this operation will not be effected.

Data

The default baud rate of the data link is 38.4kBaud with 8 data bits, one stop bit and no parity. No handshaking is used.

The data interface conforms to IEC 61162-1.

The CSB200 outputs the following NMEA 0183 messages VDM, VDO, RMC, ACA, ACS, ALR, TXT and ACK.

PRODUCT SPECIFICATION

Physical:

Dimensions 190 x 128 x 50 mm (L x W x H)

Weight 600g

Power

DC (9.6-15.6V)

Average power consumption 4W

Peak current rating 2A

GPS Receiver (AIS Internal)

IEC 61108-1 compliant

Electrical Interfaces

RS232 38.4kBaud bi-directional

RS422 NMEA 38.4kBaud bi-directional

Connectors

Power

VHF Antenna connector BNC

GPS Antenna connector TNC

Interface RS232/RS422

VHF Transceiver

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

Sensitivity - 107dBm 25kHz (Message Error Rate 20%)

Co-Channel 10dB

Adjacent Channel 70dB

IMD 65dB

Blocking 84dB

Environmental

IEC 60945

Operating Temperature: -25ºC to +55ºC

Indicators

On, TX, RX, Status, TX timeout, Error, TX Off

STANDARDS

This product complies to all the necessary standards under the European R&TTE directive for Article 3.1(a), 3.1(b), 3.2 and 3.3(e). The following standards have been followed in pursuance of this:

IEC62287-1: 2006-03 Maritime navigation and radiocommunication equipment and systems – Class B shipborne equipment of the automatic identification system (AIS) – Part 1: Carrier-sense time division multiple access (CSTDMA) techniques

IEC60945: 2002-08 Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results

IEC61162-1: Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners

IEC61108-1: GLOBAL NAVIGATION SATELLITE SYSTEMS (GNSS) – Part 1: Global positioning system (GPS) -Receiver equipment - Performance standards, methods of testing and required test results

EN 301 843-1 v2.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements

EN 50383: 2002 Basic standard for calculation and measurement of electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunications system (110MHz – 40GHz)

EN60950-1:2002 Information technology equipment – Safety – Part 1: General requirements.