

**ONWA**<sup>®</sup>  
KS-200A/B

**KS-200A/B**  
**OPERATOR'S MANUAL**

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*AIS Class B+ Transponder KS-200A*  
*AIS Receiver KS-200B*

CE FC



# SAFETY INSTRUCTIONS

## Safety Instructions for the Operator

### WARNING

**Do not open the equipment.**

Only qualified personnel should work inside the equipment.

**Do not disassemble or modify the equipment.**

Fire, electrical shock or serious injury can result.

**Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire.**

Continued use of the equipment can cause fire or electrical shock. Contact an **ONWA** agent for service.

**Use the proper fuse.**

Use of the wrong fuse can damage the equipment or cause fire.

**Be sure that the power supply is compatible with the equipment.**

Incorrect power supply may cause the equipment to overheat.

## Safety Instructions for the Installer

### WARNING

**Do not open the cover unless totally familiar with electrical circuits and service manual.**

Improper handling can result in electrical shock.

**Turn off the power at the switchboard before beginning the installation.**

Fire or electrical shock can result if the power is left on.

**Be sure that the power supply is compatible with the voltage rating of the equipment.**

Connection of incorrect power supply can cause fire or equipment damage.

**Use the proper fuse.**

Use of the wrong fuse can damage the equipment or cause fire.

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## How AIS Works

### 1. What is AIS

AIS stands for Automatic Identification System. AIS increases navigational safety and collision avoidance by transmitting vessel identification, helping to reduce the difficulty of identifying ships when not in sight (e.g. at night, in radar blind arcs or shadows or at distance) by broadcasting navigational intentions to other vessels by providing ID, position, course, speed and other ship data with all other nearby ships and land based stations.

According to IALA regulations, AIS is defined as follows:

AIS is a broadcast Transponder system, operating in the VHF maritime mobile band. It is capable of sending ship information such as identification, position, course, speed and more, to other ships and to shore.

It can handle multiple reports at rapid update rates and uses Carrier Sense Time Division Multiple Access (CSTDMA) technology to meet these high broadcast rates and ensure reliable and robust ship to ship operation.

The IMO defines the performance standards as follows:

Ship to ship working, ship to shore working, including long range application, automatic and continuous operation, provision of information messaging via PC and utilization of maritime VHF channels.

### 2. What AIS classes do exist?

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

## 2.1 Class A

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 crafts may also be fitted under A units.

The Class A operation consists of three different types of messages:

Dynamic information:

- position of the ship (derived from GPS)
- time, when the position was measured in UTC
- course over ground (COG)
- speed over ground (SOG)
- heading (HDG)
- ship status
- rotational speed/turn rate

Static information:

- MMSI number
- call sign and name of the vessel
- length and width of the vessel
- IMO-number of the vessel, if existent
- type of vehicle
- position of the GPS sensor onboard

Journey-related information:

- draught of the vessel
- type of cargo
- port of destination and estimated time of arrival (ETA)
- route plan, optional compulsory way, depending on the vessels movement.

## 2.2 The New Class B+ Technology

The new Class B+, often referred to as “Class B SOTDMA” or “Class B 5W”, has been defined to bridge the gap between Class A and Class B transponders, offering some clear advantages for some types of vessels and applications.

Class B+ uses the same SOTDMA technology as Class A and therefore has the same priority when it comes to reserving a time slot, guaranteeing that it will always be able to transmit, even in busy AIS congested waters. For fast moving vessels this is important as a missed transmission can result in a vessel moving a long distance before it next manages to send a transmission.

Another feature that the new Class B+ technology it has taken from Class A, is the increased and automatic changing of transmission rates depending upon speed. Unlike Class A, the update rate is unaffected by whether the vessel is manoeuvring, but as the vessels speed increases, the number of transmissions increases so that other vessels get a clearer and more up to date view of where the boat is.

For slow moving vessels the increased update rates of Class B+ are not so important, but a fast power boat travelling at say 23 knots, will move 360 meters in 30 seconds, which is the update rate of a normal Class B transponder. On a Class B+ vessel travelling at 23 knots or more, the update rate is 5 seconds, so (using the above example) only 60 meters would be moved between updates.

Finally, Class B+ transponders have a higher power transmission 5 Watts instead of 2 Watts and this not only increases the range over which the vessel's transmission will be received, assuming good antenna height and performance, but it also significantly improves the AIS Satellite reception, enabling global tracking.

### 2.3 Comparison of AIS Classes

The following tables have been created to provide a “side by side” comparison of the three different classes of AIS.

#### Class A, B and B+ Functionality

Function	Class A	Class B+	Class B
<b>Transmit Power</b>	12.5W	5W	2W
<b>Transmit Rate</b>	Up to every 2-3 secs	Up to every 5 secs	Every 30 secs
<b>Minimum Keyboard + Display (MKD)</b>	YES	NO	NO
<b>Technology</b>	SOTDMA	SOTDMA	CSTDMA
<b>Guaranteed Time Slot Allocation</b>	YES	YES	NO
<b>Voyage Data</b>	YES	NO	NO
<b>External GPS Connection</b>	YES	NO	NO

As can be seen from the table above, in normal operation a Class A transponder transmits at a much higher power than a Class B. In “real-life” terms a well installed Class B transponder should be able to transmit up to 7-8NMs whilst a Class A transponder maybe seen as far as 20-25NMs away. With its 5W output, a Class B+ will be better than a Class B (2W), but not x2.5 better, typically 10-12NM should be seen.

As illustrated in the following table, Class B and B+ transmit the same data, a sub-set of the data transmitted by a Class A transponder.

Class A, B and B+ Transmitted Data

<b>Data Transmitted</b>	<b>Class A</b>	<b>Class B and B+</b>
<b>MMSI + Vessel Name + Call Sign</b>	YES	YES
<b>Position + COG + SOG</b>	YES	YES
<b>True Heading</b>	YES	YES
<b>Rate Of Turn</b>	YES	NO
<b>Nav Status</b>	YES	NO
<b>IMO Number</b>	YES	NO
<b>Type of Vessel</b>	YES	YES
<b>Vessel Dimensions</b>	YES	YES
<b>ETA + Destination + Draught</b>	NO	NO

Finally, the table below shows the different data transmit rates of the three systems. As can be seen, Class A transponders have several different transmit rates, based on speed, manoeuvring and Nav Status, whereas the Class B+ transmission rate is purely based on speed.

Comparing Class B+ to the original Class B, it can be seen that the simple two update rate (underway or stationary) of the original Class B has been expanded and increased in Class B+. For any boat that regularly travels at over 15 knots and particularly for boats capable of travelling at over 23 knots, the increased transmission rates offered by Class B+ are an important benefit.

Class A, B and B+ Transmit Rates



<b>Ship's Dynamic Conditions</b>	<b>Class A</b>	<b>Class B+</b>	<b>Class B</b>
<b>Ship at Anchor or Moored</b>	3 mins	3 mins	3 mins
<b>SOG 0-2 knots</b>	10 secs	3 mins	3 mins
<b>SOG 2-14 knots</b>	10 secs	30 secs	30 secs
<b>SOG 2-14 knots and changing course</b>	3.3 secs	30 secs	30 secs
<b>SOG 14-23 knots</b>	6 secs	15 secs	30 secs
<b>SOG 14-23 knots and changing course</b>	2 secs	15 secs	30 secs
<b>SOG &gt; 23 knots</b>	2 secs	5 secs	30 secs
<b>Ship Static Information</b>	6 mins	6 mins	6 mins

# SPECIFICATIONS

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## Physical:

- Dimension : 207mm (length) x 155.8mm (Width) x 50mm (Height)
- Weight : 0.8kg

## Power:

- Input: 10 ~ 35VDC
- Power consumption 0,35A nominal , 2A peak

## Electrical Interface:

- RS232 38.4kbaud bi-directional

## Environmental:

- IEC 60945 (Cat C)
- Operating Temperature: -25°C to +55°C

## KS-200A:

GPS Receiver (AIS Internal)

- IEC 61108-1 compliant

## Connectors

- VHF Antenna connector PL259 female
- GPS Antenna connector BNC female
- RS232 data connector Female 9 Way D-type

## VHF Transceiver

- Transmitter x 1
- Receiver x 2 (one time shared between AIS/DSC)
- Frequency: 156.025 to 162.025 MHz in 25KHz steps
- Output power >5 Watt (37dBm $\pm$ 1.5 dB)
- Channel bandwidth: 25KHz
- Modulation modes 25KHz GMSK / AFSK
- Bit rate 9600 b/s GMSK & 1200 b/s FSK
- RX sensitivity <-123dBm @ 20% PER

**KS200B:**

## Connectors

- VHF Antenna connector PL259 female
- Power/data connector GX-16 8 pins male

## VHF Receiver

- Receiver x 2 (one time shared between AIS/DSC)
- Frequency: 156.025 to 162.025 MHz in 25KHz steps
- Channel bandwidth: 25KHz
- RX sensitivity <-123dBm @ 20% PER

## Compliant with the following standards:

- IEC62287-1 (IEC standard, Class B shipborne equipment)
- IEC60945 Edn 4.0 (IEC standard, environmental requirements)
- ITU-RM.1371-1 (Universal AIS Technical Characteristics)
- IEC61162-1 Edn. 2.0 (IEC standard, digital interfaces part 1)
- IEC61108-1 (IEC standard, GPS receiver equipment)

# KS-200A BASIC OPERATION

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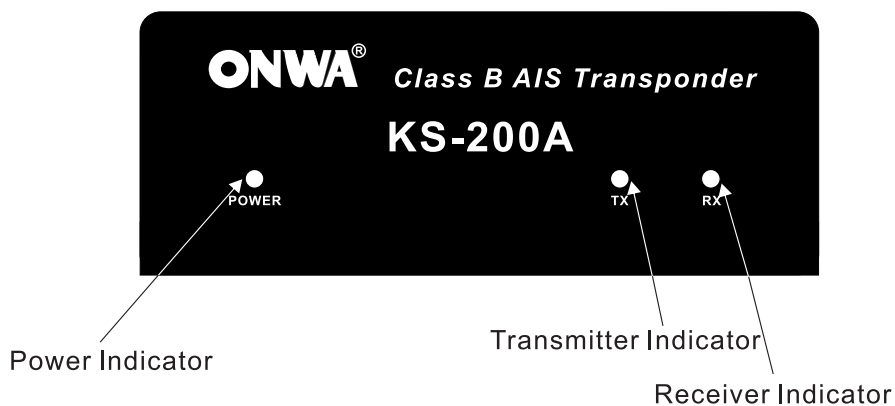
## Turning Power ON/OFF

### Turning Power ON

Press [ON/OFF] to ON direction to turn on the power.

### Turning Power OFF

Press [ON/OFF] to OFF direction to turn off the power.



1. Transmitter Indicator will blink during transmission of own ship AIS information.
2. Receiver Indicator will blink when AIS information of other vessels is received.
3. Power Indicator lights up when equipment is turned on.

# KS-200B BASIC OPERATION

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## Turning Power ON/OFF

### Turning Power ON

Press [ON/OFF] to ON direction to turn on the power.

### Turning Power OFF

Press [ON/OFF] to OFF direction to turn off the power.



1. Receiver Indicator will blink when AIS information of other vessels is received.
2. Power Indicator lights up when equipment is turned on.

# INSTALLATION

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## 1.Scope of Delivery

Description	Part Number	Quantity	Remark
Main unit	KS-200A/B	One	
Power/data Cable	KS2-PWR/data	One	
Quick installation Manual	KS2-manual	One	

## 2.Power Connection

Connect power cable to 12VDC (10~ 35VDC) supply, white wire to supply positive +ve and black wire to supply negative -ve.

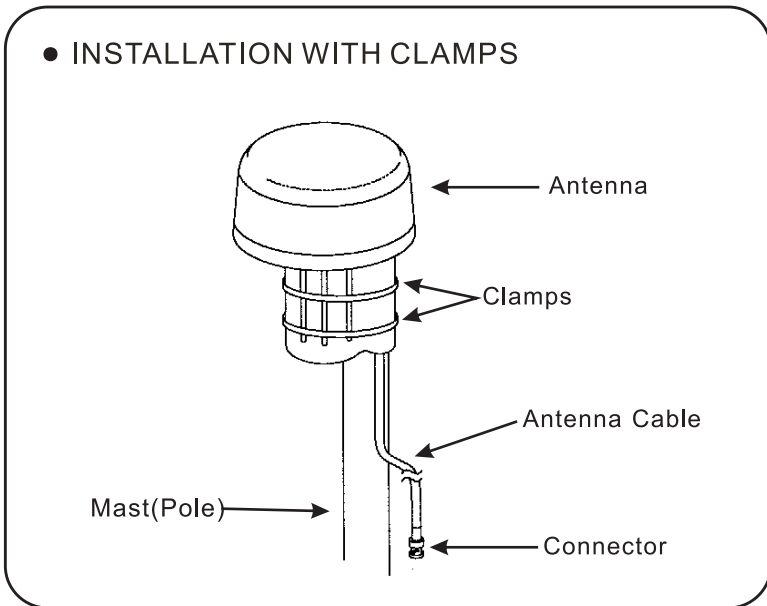
## 3. Antenna Connection

Connect the GPS antenna (supplied as an option) to the BNC female connector on the Main unit. (KS-200A only)

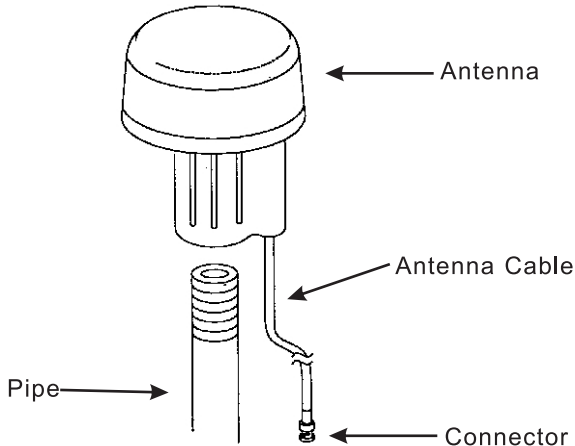
Connect VHF antenna (supplied as an option) to the PL-259 female connector on the Main unit (Please refer to the connection diagram of Page 16 )

#### 4. Installation of GPS Antenna (For KS-200A only)

- The GPS antenna is mounted in an elevated position and free of shadow effect from the ship's superstructure.
- The GPS antenna has a free view through 360 degrees with a vertical angle of 5 to 90 degrees above the horizon.
- 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 that the GPS antenna is free from direct view of the radar and the Inmarsat beam.
- 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 2 meters from these antennas.



● INSTALLATION WITH A PIPE (CUSTOMER'S CARE)



## 5. Installation of VHF Antenna

For the VHF antenna, there is a VHF female bulkhead connector used that mounts to the back of the case.

The VHF antenna intended for AIS use:

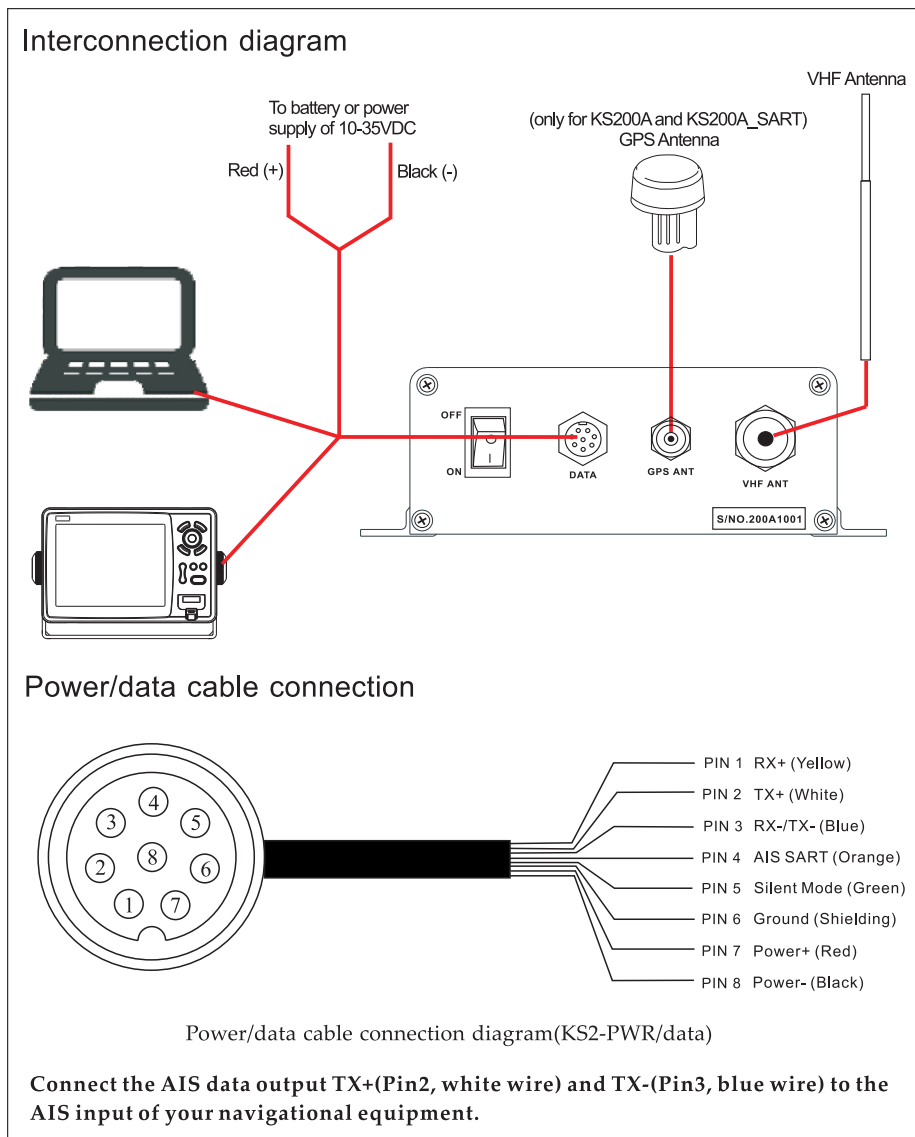
- Must be a dedicated antenna, i.e. not shared with any other VHF transmitter/receiver.
- Must be suitable for marine shipboard applications (index of protection, ruggedness, means of mounting, etc.).
- Should be omnidirectional and vertically polarized with unity gain (0dB) with a bandwidth sufficient 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 two meter vertical separation distance from any other VHF antenna used for speech or DCS communication.



## 6. Connect to other navigational equipment

You can use the delivered cable (KS2-PWR/data) to connect the AIS to other navigational equipments such as plotter, radar etc.

Connect the GX16 female connector of KS2-PWR/data cable to the GX16 male socket of KS200A/B. Connect the other end of KS2-PWR/data cable to external navigational equipments according to the following diagram :



## 7. Connect to PC

Connect the AIS data to the PC using the supplied KS2-PWR/data cable

Connection is as follows:

KS-200A/B	9-pin serial port of the computer
White-TX Data	2-Receive data
Yellow-RX Data	3-Send data
Blue-GND	5-GND

## 8. DATA SERIAL PORT

The default baud rate of the data link is 38.4kBaund with 8 data bits, one stop bit and no parity. The data interface conforms to IEC 61162-1.

The sent messages VDM, VDO, RMC, GSV, GGA and GSA are conformed to NMEA 0183. Please refer to NMEA 0183 for full details of these AIS messages.

# MAINTENANCE and TROUBLESHOOTING

## 1.Maintenance

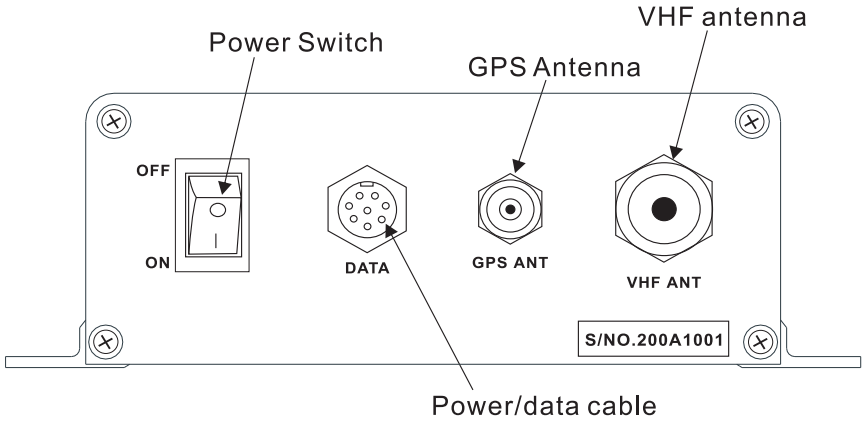
Unauthorized opening of the KS200A/B system will invalidate the warranty. Avoid using chemical solvents to clean the KS200A/B as some solvents can damage the case material. To clean, wipe down with a damp cloth. The KS200A/B contains no user serviceable parts. Contact your Service Agent for repair or for replacing.

## 2.Troubleshooting

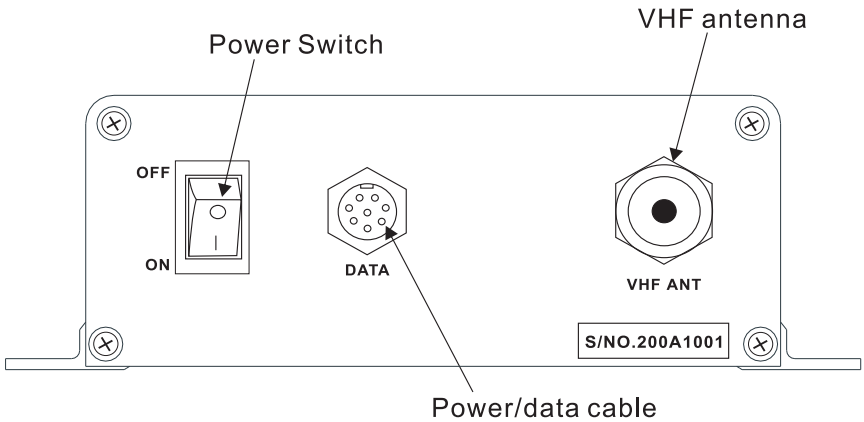
Problem	Cause	Solution
Cannot switch on	Power cable broken	Replace or reconnect power cable
	Power supply problem	Check power supply
	Blown Fuse	Replace suitable fuse rating. Call service if fuse is blown again after replacement
Unable to see AIS vessel around	KS200A/B is not switched on	Switch on KS200A/B
	VHF antenna not connected properly	Reconnect VHF antenna
	No AIS vessel around	Check again in harbor
Other AIS vessel unable to see us (For KS200A)	KS200A is not switched on	Switch on KS200A
	GPS antenna not connected properly	Reconnect GPS antenna
	VHF antenna not connected properly	Reconnect VHF antenna
	Incorrect power supply voltage	Check power supply and replace if necessary

# CONNECTION DIAGRAM

## KS200A Connection Diagram



## KS200B Connection Diagram



# DIMENSION

