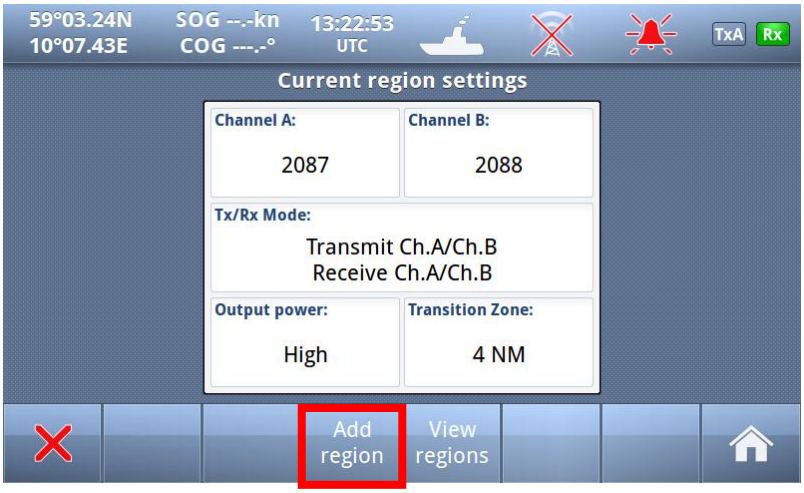
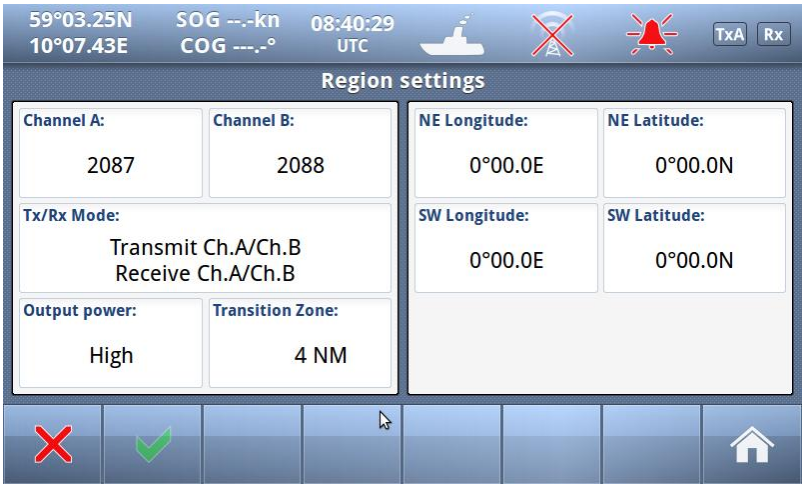
10.1.3.3 Add Region

The user is allowed to Add Regions, but caution is advised (see **10.1.3**).
It is not allowed to delete regions, they will be deleted on timeout after 24 hours inactivity, if the ship is more than 500NM away from the region, or if the region is overwritten. There is a maximum amount of 8 regions in addition to the HIGH SEA region



Red square shows  button selected to get to next menu



When "Add Region" is selected, default values for Channels, Tx/Rx Mode, Power and Transition zone are configured, but all these parameters may be altered together with defining position of the North East and South West corners of the Region.

10.1.3.3.1 Change Channel

NOTE! BE AWARE THAT SETTING OF CHANNELS WITHOUT SPECIFIC KNOWLEDGE OF CORRECT SETTING MAY ALTER YOUR AND OTHER VESSELS SECURITY AS:

- YOU MAY TRANSMIT ON ILLEGAL CHANNELS
- YOU MAY NOT BE SEEN ON OTHER VESSELS AIS
- OTHERS MAY NOT SEE YOU
- THIS CAN IN WORST CASE LEAD TO COLLISIONS

When you select either the buttons “Channel A” or “Channel B” you may input the correct channel number.

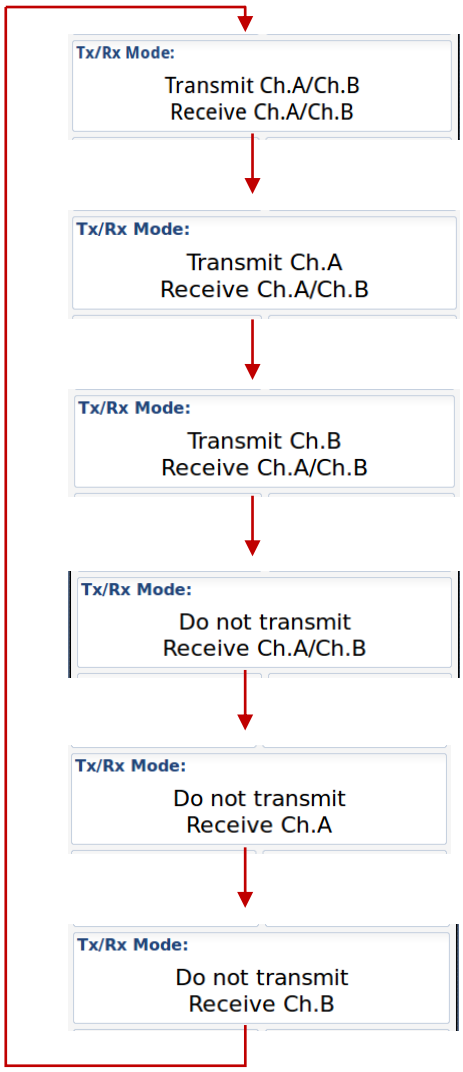
The default channels 2087 and 2088 are the same as 87B or 88B used previously as Coast Station frequencies on 161.975 MHz and 162.025 MHz.

See complete list in Chapter **12** and for updates of this list from ITU RR, Appendix 18

10.1.3.3.2 Tx/Rx Mode

Tx/Rx Mode allows you to change setting in which the transponders will use the two regional channels for transmission (Tx) and reception (Rx)

When you press the button “Tx/Rx Mode” it will toggle between the valid configurations:

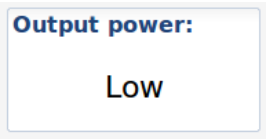


- Default – will transmit/receive on both channels

10.1.3.3.3 Output Power

The button “Output Power” will toggle between “High” and “Low” power:

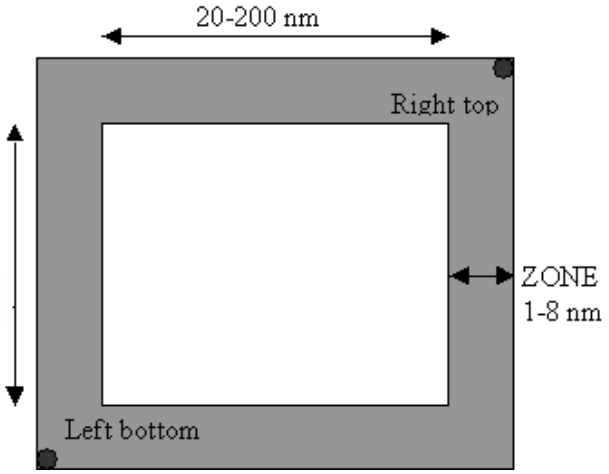
(12.5 Watts)



(1 Watt)

10.1.3.3.4 Transition Zone

A Region must be between 20 an 200 Nautical miles and within this region there will be a “Transition zone” between 1 and 8 Nautical miles:



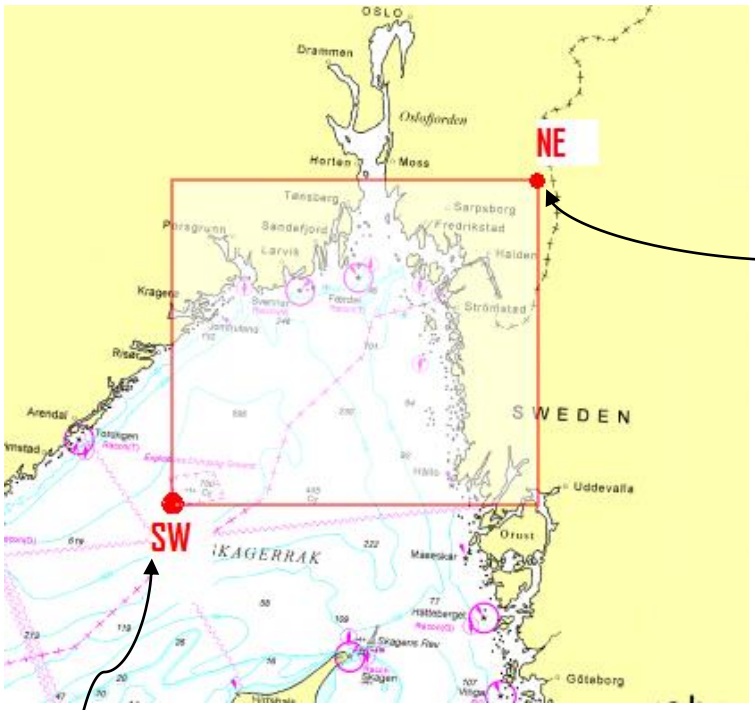
This zone is used for frequency transition so only one frequency is changed at a time. There are defined rules for how the AIS will behave through this zone.

The AIS will continuously monitor for its own position and range to the regional areas defined. When entering transition zone for Region 1, frequency is changed on the primary channel. The AIS is now sending the primary frequency defined for each of the regions.
When the boundary for the Region 1 is crossed, the second frequency shall be changed. Then the primary frequency for the old region (or default setting) is switched with the secondary frequency for the new region. Then both frequencies have changed.
When entering another region, frequency transition is performed as described above with the frequencies (settings) of the new region. When leaving a region, frequency transition is performed back to default values.

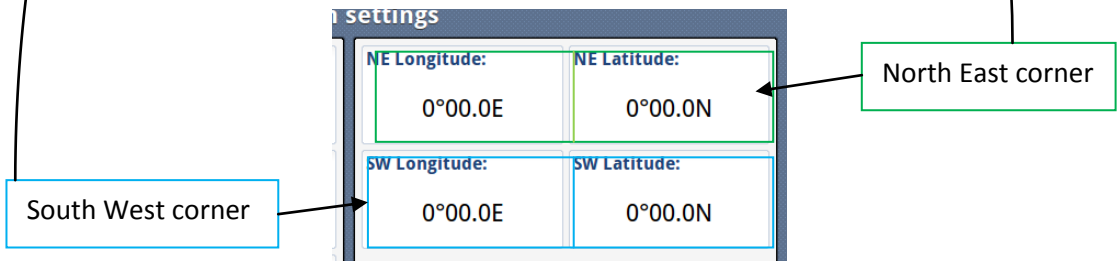
To change the value of this “Transition Zone”, select the button and input value between 1 and 8 (Nautical miles)

10.1.3.3.5 Define Region

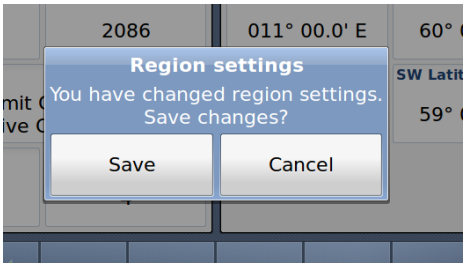
A Region must be between 20 an 200 Nautical miles as described above and you must define the Longitudes and Latitudes of the South West and North East corners:



The values are defined by selecting these 4 buttons:

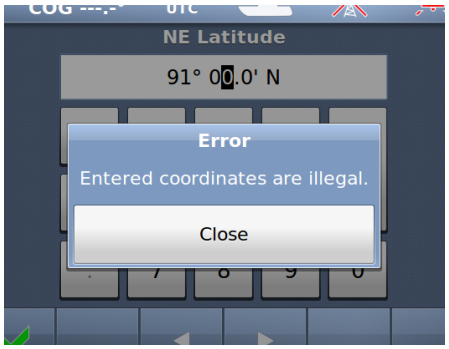


If the values are within 20 – 200 NM, they will be accepted, and you will be asked if you want to save it:



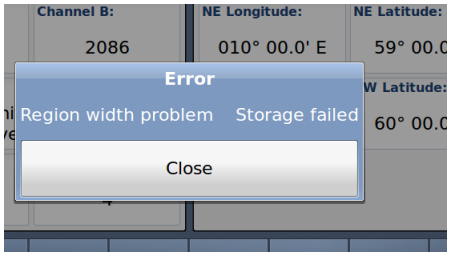
Otherwise you may experience errors:

10.1.3.3.5.1 Illegal Coordinates



Example: Too large value for Latitude

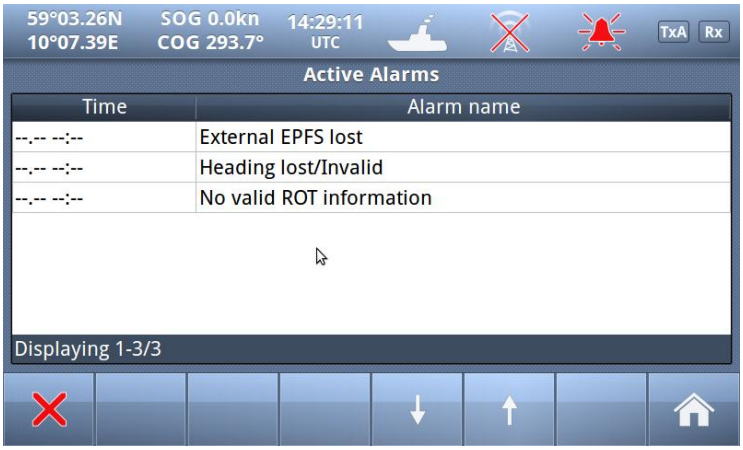
10.1.3.3.5.2 Region Width /Height problem



Example: Too large value for “Region width”

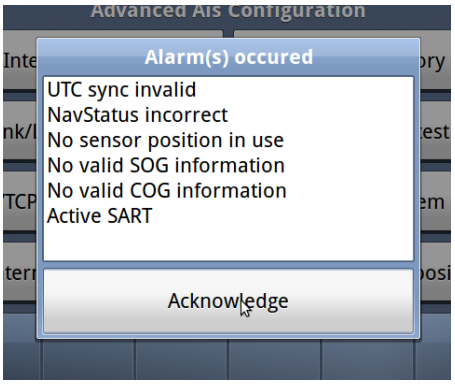
10.1.3.4 Alarms

Red square shows
button selected to get to next menu



10.1.3.4.1 Alarm Popup

When Alarms occurs, a popup will be shown with status of Alarms:



And the “Alarm” popup must be acknowledged by pressing the button below Alarm window

The internal Alarm is triggered if a failure is detected in one or more of the AIS functions or data. The corresponding message is given as in Table 2. The most probable source of error and corresponding system behavior is described together with some notes on troubleshooting the error.

Alarm ID	description text	Cause / Source of error	Reaction of the system and user advise
001	Tx malfunction	VHF Antenna or cabling mismatch. Alternatively Invalid MMSI	The Transponder stops transmission. Check the antenna cabling for short or open circuits. Alternatively check the VHF antenna. Check that the MMSI number is correct.
002	Antenna VSWR (Voltage Standing Wave Ratio) exceeds limit	VHF antenna or installation	The Transponder continues transmission. Check the VHF antenna and the cabling. Make sure the cables are 50 Ohm
003	Rx channel 1 malfunction	Internal frequency error*	The Transponder stops transmission on the affected channel. Try rebooting the system Alternatively, service is needed
004	Rx channel 2 malfunction	Internal frequency error*	The Transponder stops transmission on the affected channel. Try rebooting the system Alternatively, service is needed.
005	Rx channel 70 malfunction	Internal frequency error*	The Transponder continues normal transmission but is not able to receive DSC messages. Try rebooting the system Alternatively, service is needed.
006	General failure	Missing MMSI, internal error	The Transponder stops transmission. Check MMSI and the other parameters.
007	UTC sync invalid	GPS antenna or installation	The Transponder continues operation using indirect or semaphore synchronisation with other AIS units. If the received GPS signal strength is low, the GPS might use some time to get the first fix. Consider waiting 15 minutes. Check the GPS antenna and cabling. If the antenna is an active type, check that the phantom DC voltage is correct

008	MKD connection lost	Connection between the Display Unit and the Transponder is corrupted	The Transponder continues operation, and alerts other AIS systems that no display is present. Check that the display is turned on. Check that the cable is correct connected in both ends. Check the IP address and corresponding communications IP address of both units if using the Ethernet connection. Check for firewall error or such if connected through a local network.
009	Internal / external GNSS position mismatch	Internal or External GPS or Antennas	The Transponder continues operation, but as this might imply that wrong position is used. Care should be taken as this might impose a risk both for own and other ships. Check the positioning of the GPS antennas. Disconnect the External GPS and check if the internal GPS provides the correct position.
010	Navigational Status incorrect	Setup or speed sensor (Navigational status does not correspond with the given speed)	The Transponder continues operation. Check that navigational status is not at anchor, moored or aground while SOG > 3knots. Check that navigational status is not under way while SOG = 0 knots. Check that SOG is correct.
011	Heading sensor offset	COG sensor / HDT sensor Alarm ID 11 is activated when SOG is greater than 5 knots and the difference between COG and HDT is greater than 45 degrees for 5 min.	The Transponder continues operation. Alarm indicates mismatch between Course over ground and True heading. Check sensors. If current speed is <5knots, check SOG
014	Active AIS SART	AIS Search and rescue beacon activated	The Transponder continues operation. Contact local RCC (Rescue Coordination Centre). Be prepared to assist in search and rescue operation. Listen on VHF channel 16 for additional information.
025	External EPFS lost (External Satellite Positioning System)	No valid position data on sensor ports	The Transponder continues operation with the internal GPS receiver. If no valid position is present on the internal sensor, ALR26 is also displayed. Check antenna and connections for EPFS, check sensor. Check baud rate settings.
026	No sensor position in use	Internal and external GPS sensor	The Transponder continues operation. Check cabling and antenna for the internal GPS sensor. At start up the GPS might need some time to receive almanac data. Up to 15 minutes might be required.
029	No valid SOG information	Internal and external speed sensor	The Transponder continues operation using default data. Check wiring and external sensor. Check baud rate settings.
030	No valid COG information	Internal and external course sensor	The Transponder continues operation using default data. Check wiring and external sensor. Check baud rate settings.

032	Heading lost/invalid	External heading sensor	The Transponder continues operation using default data. Check wiring and external sensor. Check baud rate settings.
035	No valid ROT information	External rotation sensor	The Transponder continues operation using default data. Check wiring and external sensor. Check baud rate settings.

Table 2: Integrity alarm conditions signaled using ALR sentence formatter.

***The Rx Alarm is triggered if one of the internal frequency generators is out of lock, making the receiver unable to function at the correct frequency.**

10.1.3.5 Alarm Relay Output

The Alarm relay is a normally open earth free relay contact, provided as an independent and simple method for triggering an external alarm. The alarm relay is deactivated upon acknowledgment of an alarm, either internally on the display unit, or by an externally provided ACK sentence. If the Transponder power is lost, and the Alarm relay has power, the alarm will be triggered. In this case, the only way to deactivate the Alarm is to power the Transponder unit or disconnect the power source of the Alarm relay.

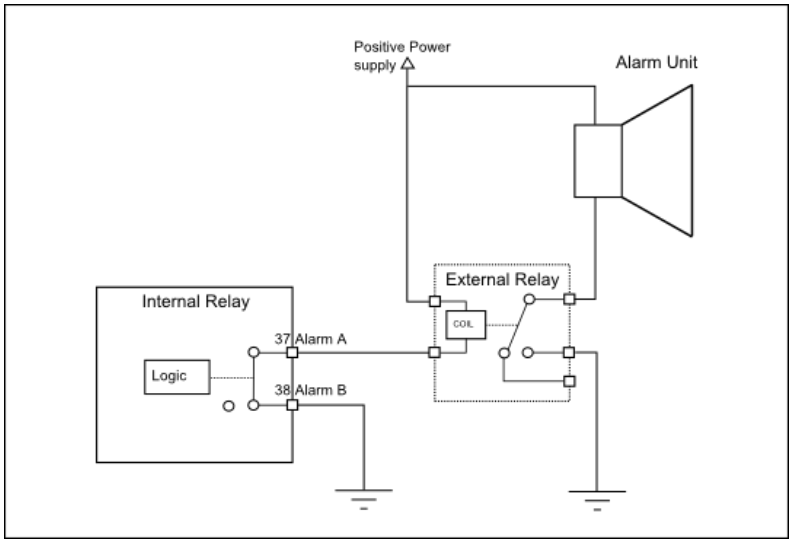
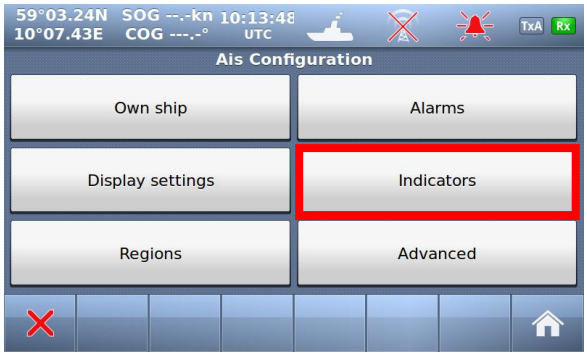
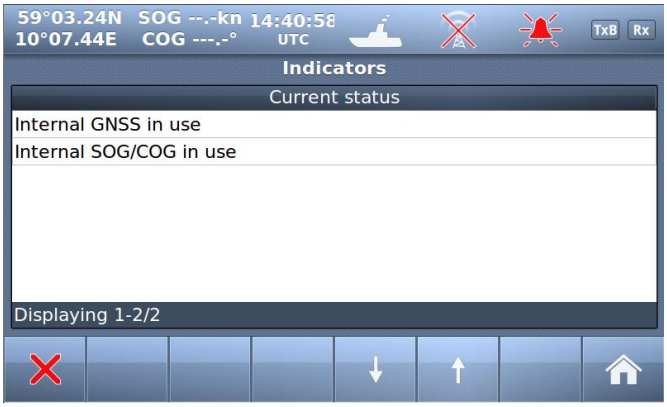


Figure 10-1 Typical Alarm connection

10.1.4 Indicators



Red square shows button selected to get to next menu

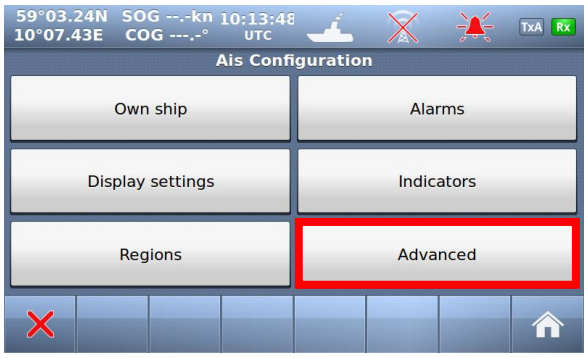


The *indicators* show information about where sensor data are collected, valid Heading etc. This list may be used if troubleshooting of the sensors is needed. The available messages are as given in .

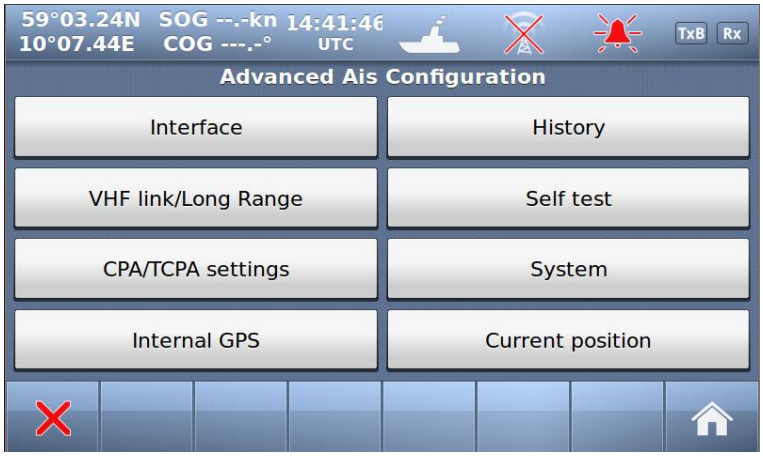
Text Identifier	"Indicators" (Shown on Display unit and also sent as text message to ECS/ECDIS or other equipment connected to PI port)	Description
021	External DGNSS in use	DGNSS is normally the same as DGPS, which indicates external type of such sensor is in use
022	External GNSS in use	GNSS is normally the same as GPS, which indicates external type of such sensor is in use
023	Internal DGNSS in use (beacon)	Internal DGNSS (DGPS) (beacon) in use indicates a DGNSS beacon receiver is connected and transmit valid data to TR-8000
024	Internal DGNSS in use (Message 17)	Internal DGNSS (DGPS) (Message 17) in use indicates Differential correction data is sent from an AIS Base Station to this TR-8000 transponder
025	Internal GNSS in use	The inbuilt GNSS (GPS) receiver is in use
027	External SOG/ COG in use	SOG (Speed Over Ground)/ COG (Course Over Ground) from external GNSS(GPS) device is in use
028	Internal SOG/ COG in use	SOG (Speed Over Ground)/ COG (Course Over Ground) from internal GNSS(GPS) device is in use
031	Heading valid	True Heading is received from either an external Gyro or Satelitte compass
033	(ROT) Rate of Turn Indicator in use	ROT received from external sensor: TI (Turn Indicator)
034	Other ROT source in use	No TI(Turn Indicator) from external sensor, ROT(Rate of Turn) value is calculated from HDT internally
036	Channel management parameters changed	If either "Region setting" is applied manually or from msg received from AIS Base Station, this indicator will be shown.

Table 3: Indicators.

10.2 Advanced Menu



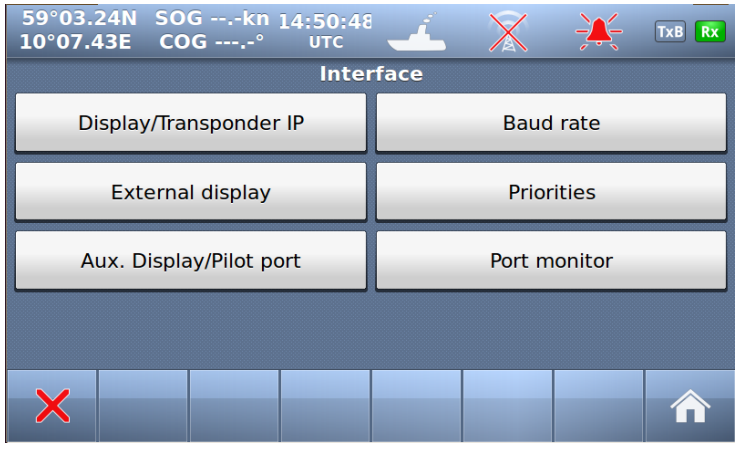
Red square shows button selected to get to next menu



The **Advanced Menu** is intended for use during setup and maintenance of the TR-8000 AIS system. Some of the menus are write protected by password, but all parameters are readable to all users for inspection.

10.2.1 Interface

Red square shows button selected to get to next menu



In the “Interface” menu, the parameters shown on the left picture can be configured.

10.2.1.1 Display/ Transponder IP

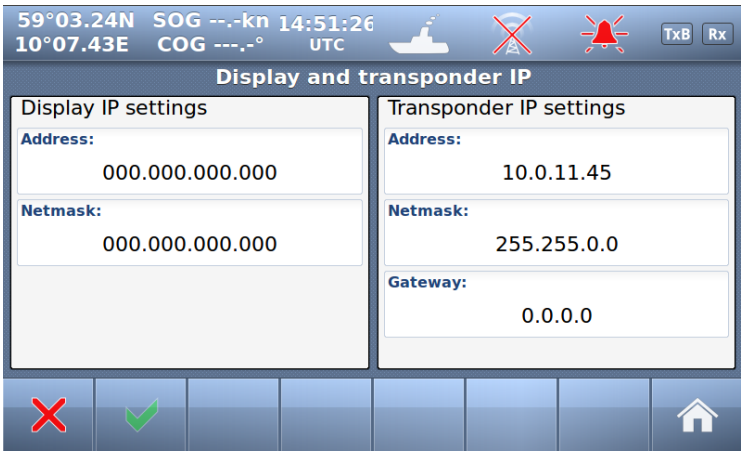
NOTE! Since the TR-8000 uses Ethernet between transponder unit and display, an IP addresses must be correctly configured

All parameters /buttons are "grayed out" as they are not accessible without "Admin Pswrd"

When "Admin pswrd" button is selected, the following window appear:

Input the "Admin Password" (SE) into the field and press the "Confirm" button: 

Then it is possible to access all fields and configure IP correctly:



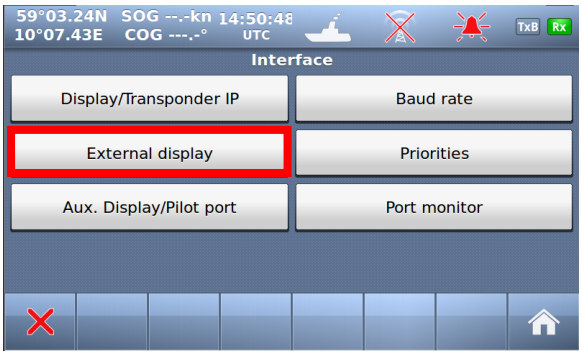
Default values are:

Display:
Adress: 10.0.0.11
Mask: 255.255.0.0
Transponder:
Adress: 10.0.0.10
Mask: 255.255.0.0
Gateway: 0.0.0.0

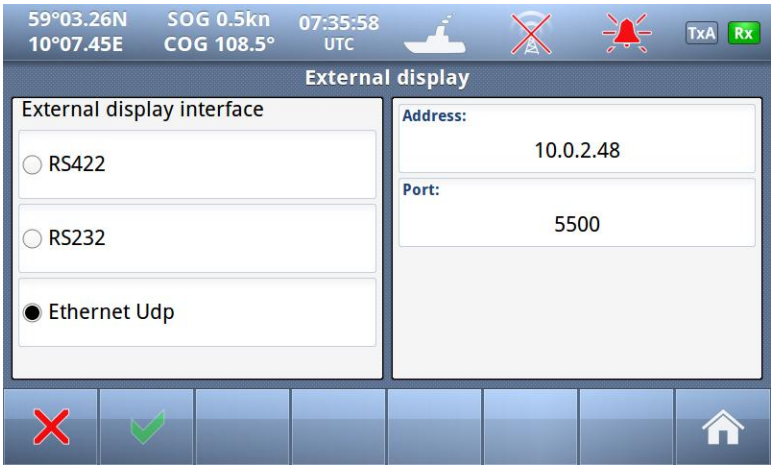
(Gateway is only used if Transponder communicates through a router that performs NAT (Network Address Translation). Then the Router address must be written here as "Gateway")

And when configuration is finished either of "Return" or "Confirm"  buttons will bring you back to last menu.

10.2.1.2 External display

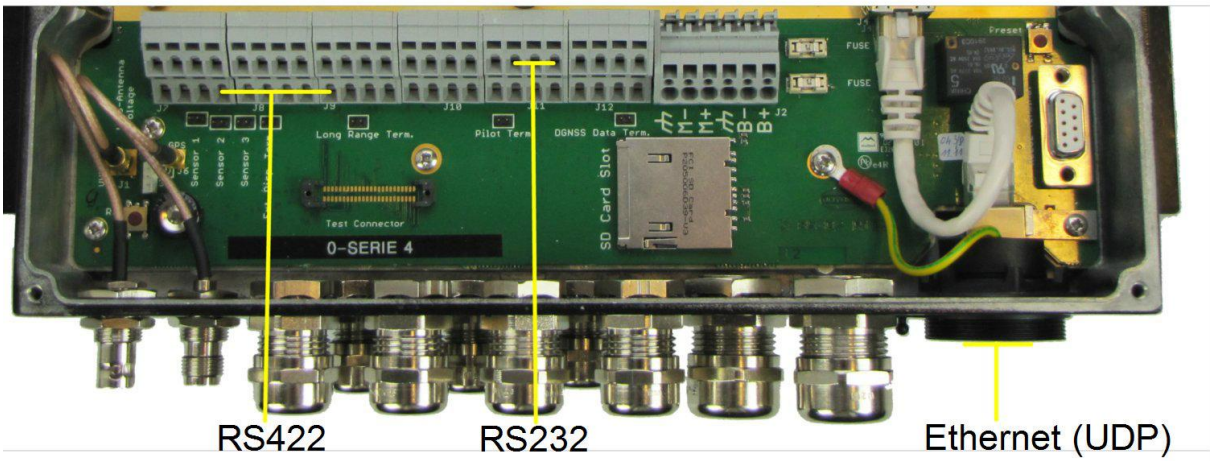


Red square shows  button selected to get to next menu



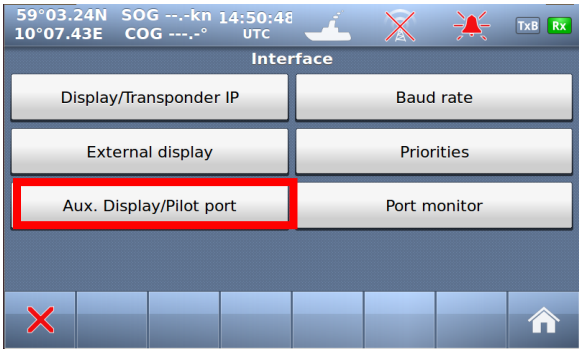
The TR-8000 support three different methods of connecting an external Display.

If Ethernet is used, the External Display should be connected through an external Ethernet switch since the TR-8000 Display unit is already connected to this connector

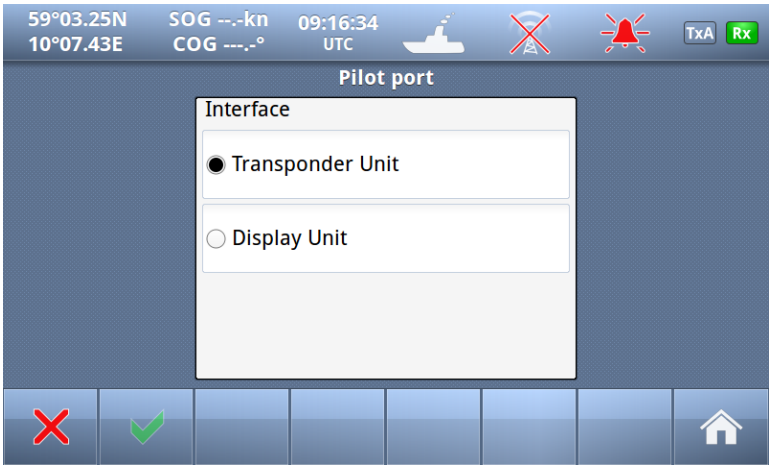


see also chapter **8.3.1.5** which describes the External Display physical connections

10.2.1.3 Aux. Display/Pilot Port



Red square shows button selected to get to next menu



The TR-8000 has the flexibility of either connecting the Pilot port outlet to the Transponder unit or the Display unit, and therefore you may select which of the two option you want to use.

Below pictures shows where the physical connections are made.

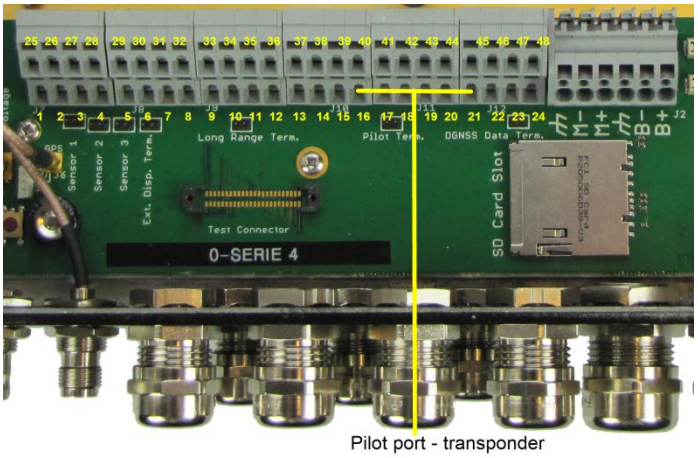


Figure 10-2 Pilot port connection, TR-8000 Transponder unit

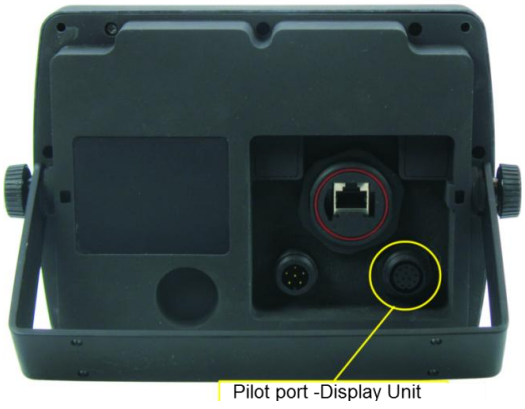
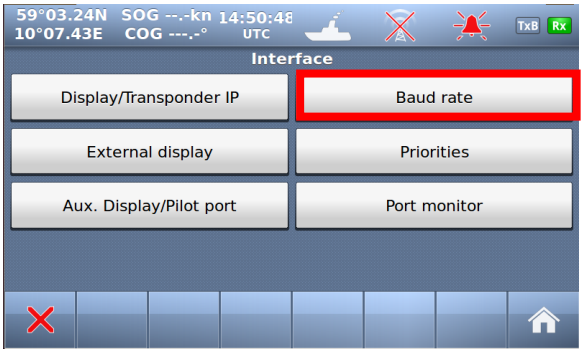


Figure 10-3 Pilot port connection, TR-8000 Display unit (rear)

Figure 10-5 Pilot port cable, Transponder unit

Figure 10-4 Pilot port cable, Display unit

10.2.1.4 Baud rate



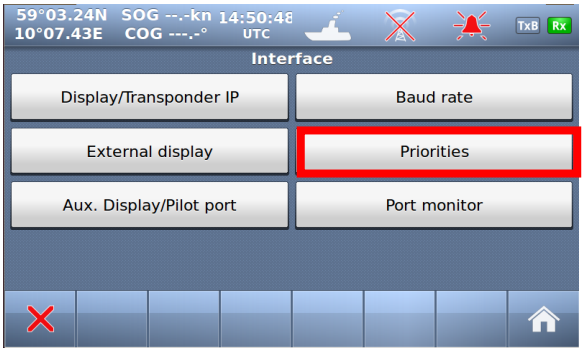
Red square shows button selected to get to next menu

Press one of the 5 Port buttons to change the baud rate of that port. It will then jump between the legal options:

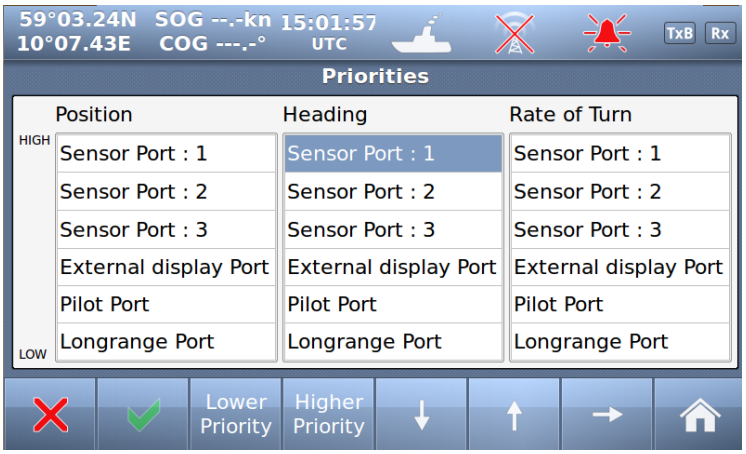
- 4800 (default: Sensor)
- 9600
- 19200
- 38400 (default: Long Range)

10.2.1.5 Priorities

From this menu the priorities for the different sensor measurements can be set individually.
I.e if the unit receives Heading data from two different sources, the settings here specify what data source to be used.
In order to navigate through the different sensors, administrator password is required.



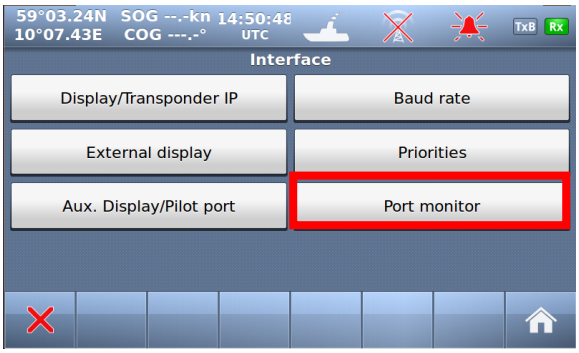
Red square shows button selected to get to next menu



Priorities of Position, Heading and Rate Of Turn can be configured in this window

Select which " Port" will have lower or higher priority.

10.2.1.6 Port Monitor

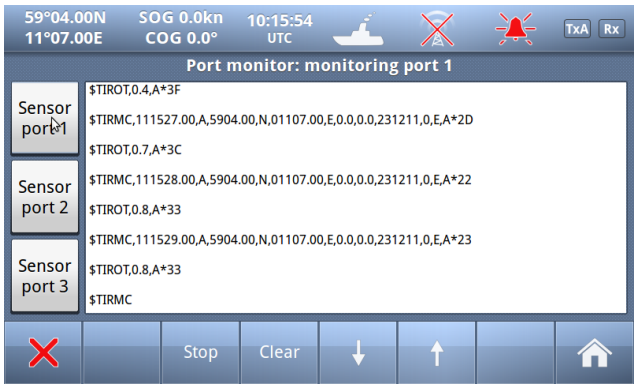


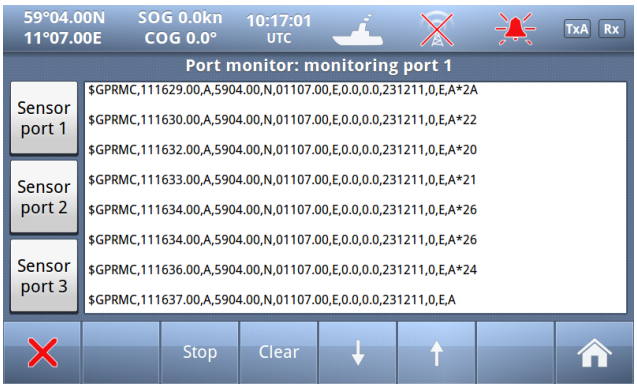
Red square shows button selected to get to next menu

"Port monitor" is an important feature in TR-8000 Display Unit which can help troubleshooting connection issues with different sensors. The "Port monitor" acts as a Terminal window, showing raw data received on a sensor, similar to Windows "Hyperterminal"

First select which "Sensor port" you want to "listen" to

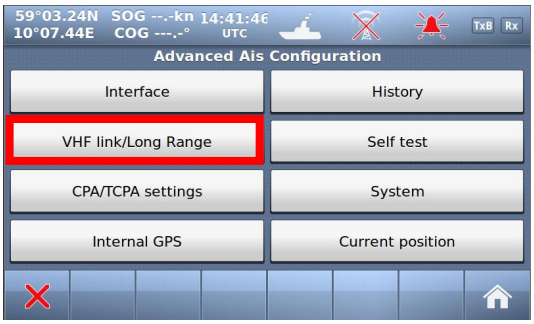
And if a Sensor is connected it could look similar to these:





The two screenshots above shows Sensor data which are most probably OK, while left screenshot shows corrupt data from incorrectly connected sensor (Polarity of signals are incorrect)

10.2.2 VHF link/Long Range



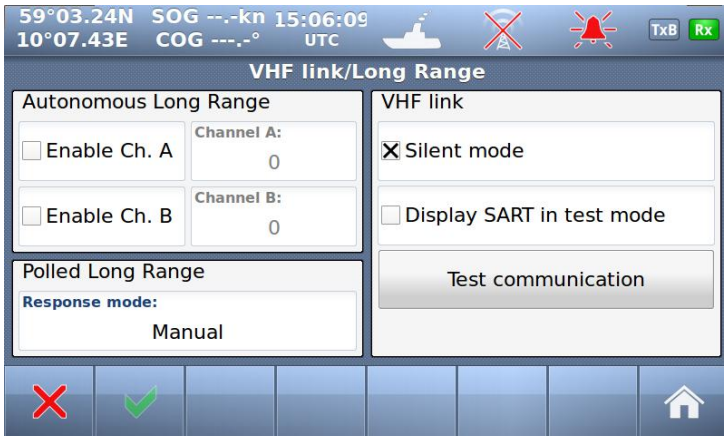
Red square shows button selected to get to next menu

In this menu, configuration of

- Long Range
- VHF Link (Silent ON/OFF)

can be done, In addition to:

- Test VHF link communication
- Display AIS-SART when such equipment are tested



10.2.2.1 Autonomous Long Range

Long Range Broadcast Channel A and B are used for broadcasting positions and ship data to a satellite system. Base Stations are able to temporarily disable the Long Range broadcast functionality of the AIS. The Long Range Broadcast may also be disabled manually by administrator.

10.2.2.2 Polled Long Range

The Polled Long Range system can be configured to reply automatically or wait for acknowledgement from the user. An indication of received LR messages is displayed for the user in either case.

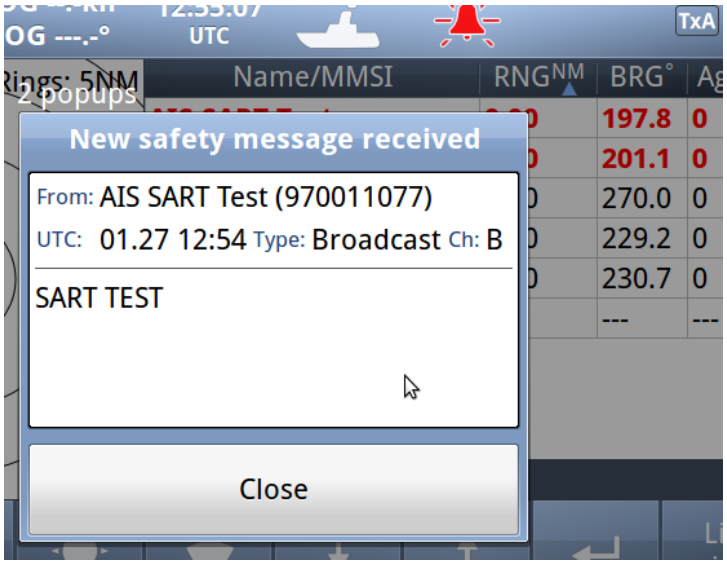
10.2.2.3 Silent mode

The silent mode is a special mode for travelling in areas where the transmission of own position impose risk to the user. When active, no signals are sent from the Transponder unit, but the user is still able to receive information from other vessels.
If the *Silent Mode* is active for more than 15 minutes, the event is logged in the *History Log.*

CAUTION: The *Silent Mode* disables the AIS Transmitter functionality and will make the Vessel invisible on the AIS system and impose a risk to other and own vessels.

10.2.2.4 Display SART in TEST mode

When AIS-SART was introduced as alternative to traditional Radar SART in 2011, it was obvious that testing such equipment could lead to much "noise" on nearby ships AIS Transponders and ECS/ECDIS as this AIS-SART icon/text message would pop up on all nearby vessels within VHF range (5-40 nautical miles). Therefore, revisions in the AIS standards were made so the person who wants to test the AIS on-board the ship, must first activate this menu item before it will be shown on the vessels AIS and ECS/ECDIS or Chart Plotter.

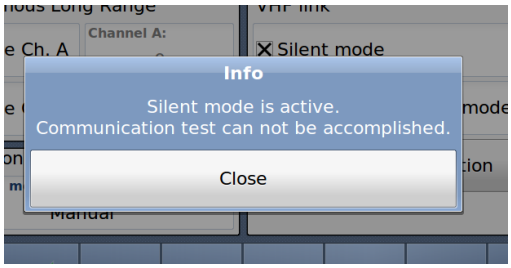


Example showing "Display SART in test mode" and Popup received to be acknowledged by pressing "Close" button

PS! Observe that here are "2 popups" received from 2 different AIS-SARTs and each "popup" must be acknowledged. Also observe that AIS-SARTs are displayed in top of the list in the background, and with RED color.

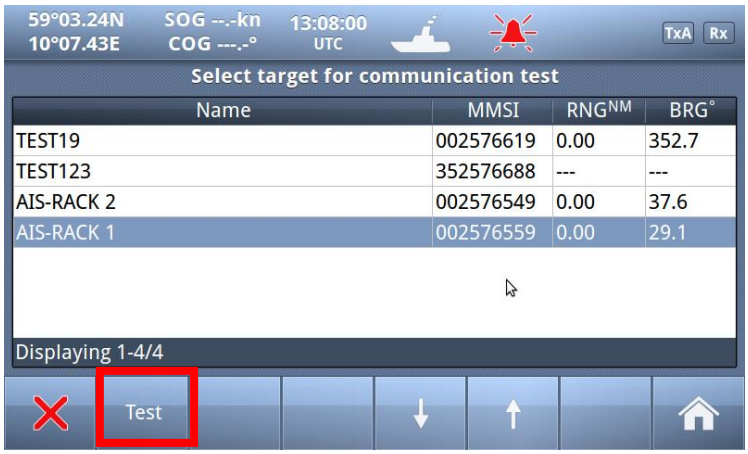
10.2.2.5 Test Communication

The Communications Test is used to test the VHF communication by transmitting a request for an acknowledgement to another ship. The target is automatically selected by the Display Unit, but the user can choose to select another target as long as the target is a Class A AIS transponder. If the Acknowledgment is not received within 10 seconds, the Communications Test has failed and the user should optionally retry with another target.



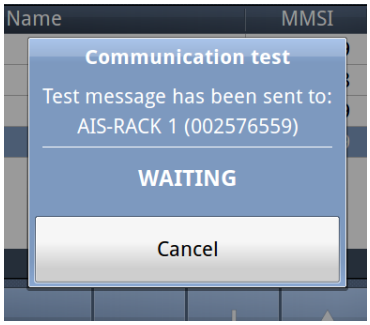
If the TR-8000 is in "Silent mode", it is not possible to perform this test:

If not, we can continue with the test:



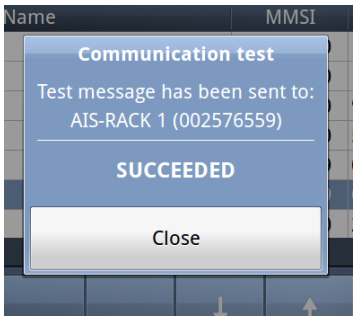
Step **#1**: Select Target

Step **#2**: Press "Test"



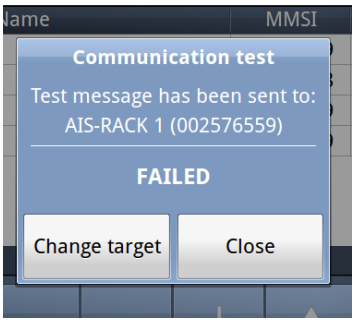
Step **#3**: Wait until test finished

Success:



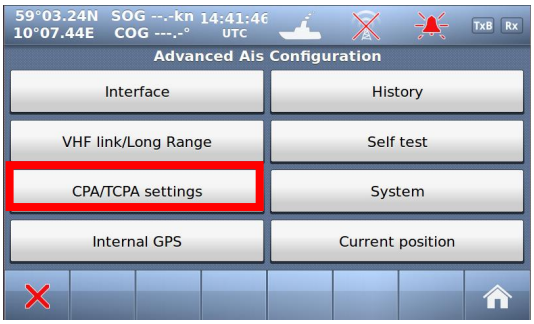
or

Failure:

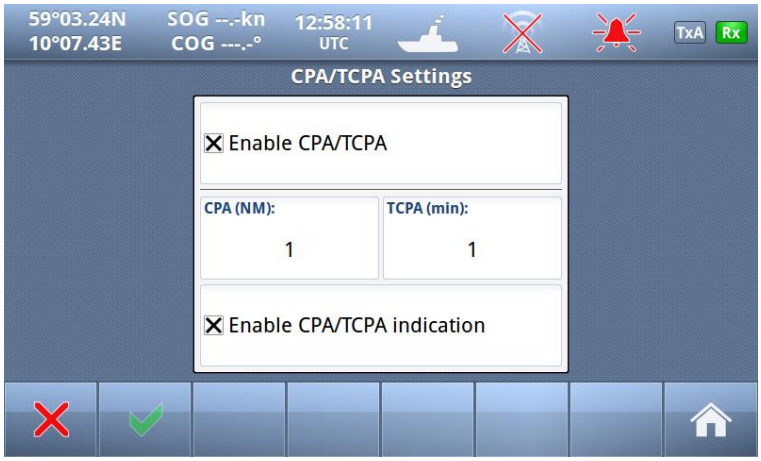


If the TEST fails, we can select another target and redo the test

10.2.3 CPA/TCPA settings

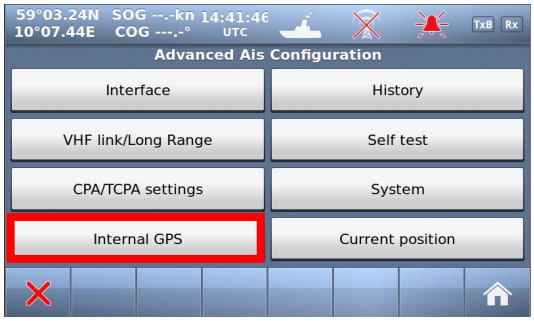


Red square shows button selected to get to next menu



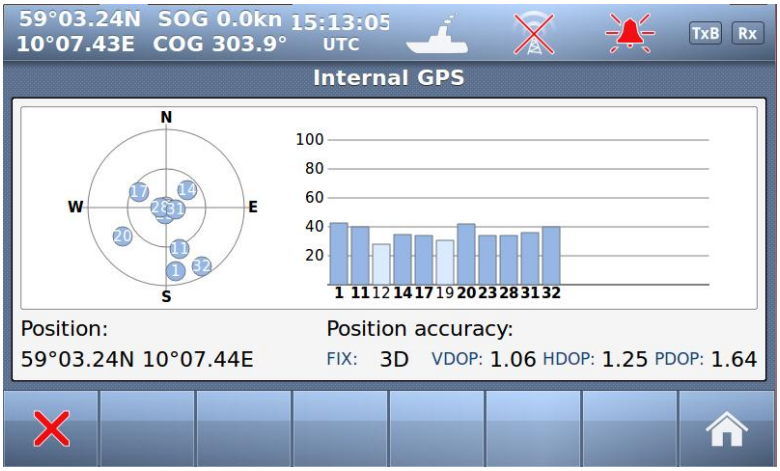
The CPA (Closest Point of Approach) and TCPA (Time to Closest Point of approach) range for which you want to be alerted of AIS targets on a possible collision course with you needs to be set here. You may also disable the CPA/TCPA functionality manually. How the user is alerted is also specified in this menu.

10.2.4 Internal GPS



Red square shows button selected to get to next menu

It is possible to inspect the functionality of the internal GPS receiver by the following parameters:

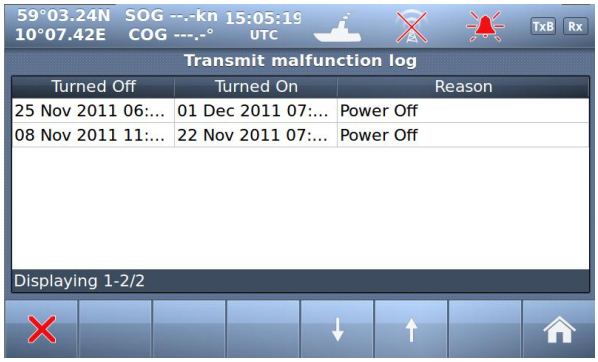


- Satellites in view
- Signal strength
- Position
- Pos. accuracy
- Precision
- Differential mode

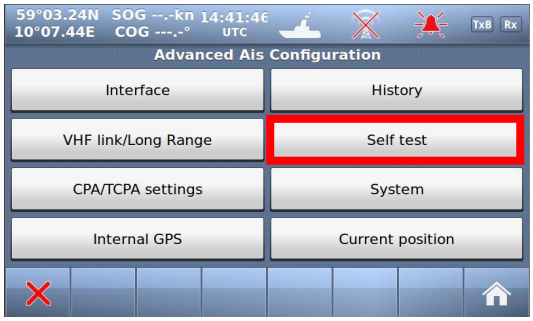
10.2.5 History Log

Red square shows  button selected to get to next menu

If the transmitter functionality of the transponder stops functioning for more than 15 minutes, this is logged as an event in the *History Log*.

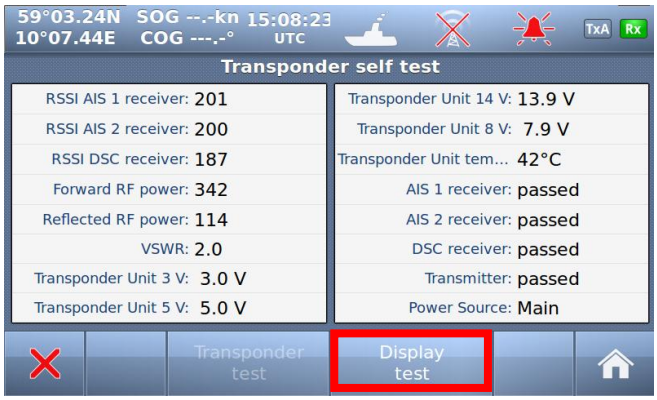


10.2.6 Self Test



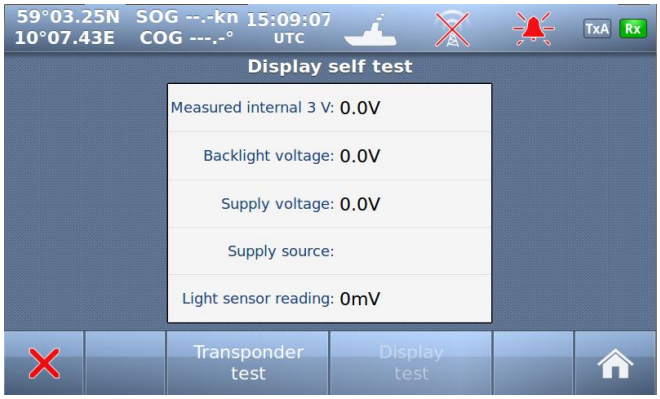
Red square shows  button selected to get to next menu

The "Self Test" consist of two different tests, a "Transponder self test" and a "Display self test":



"Transponder self test" measures values of:
Signal strength (RSSI.. 0-255)

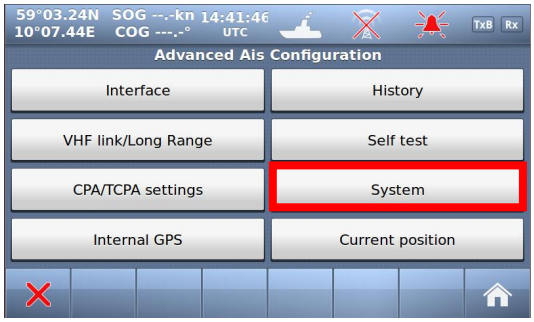
- RF Power (Forward+ Reflected :0-512)
- Antenna matching (VSWR)
- Voltages (3, 5, 8 and 14v)
- Receivers status
- Transmitter status
- Power source (Main, Backup)



When "Display test" is selected, this window is shown with measurement:

- Voltages
- Supply source (Power source)
- Light sensor reading (If automatic display adjustment are activated [option])

10.2.7 System



Red square shows 
button selected to get to next menu

In this window you can read information about :

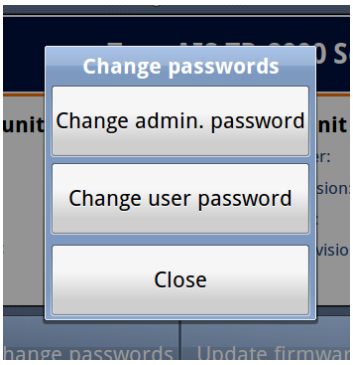
- Serial number
- Software
- Hardware

of both Display and Transponder unit

In addition you may select the buttons:

- Change password
- Update firmware

10.2.7.1 Change password

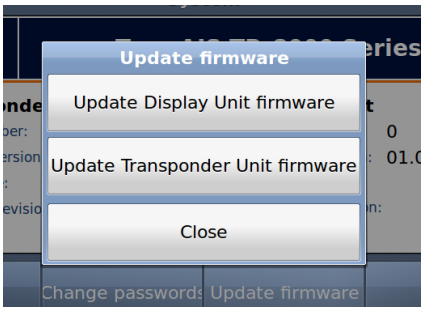


If you select “Change password”, you can select between

- Admin password
- User password

NOTE: You must have access to “Admin password” to change the “User password”

10.2.7.2 Update Firmware

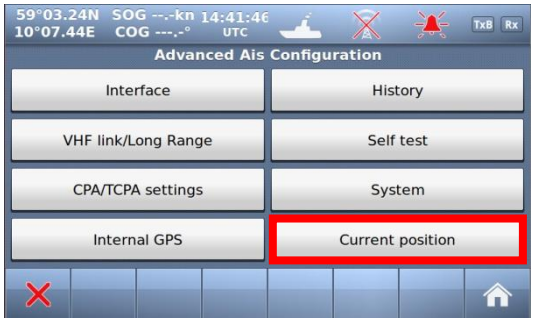


If you select “Update firmware”, you can select between

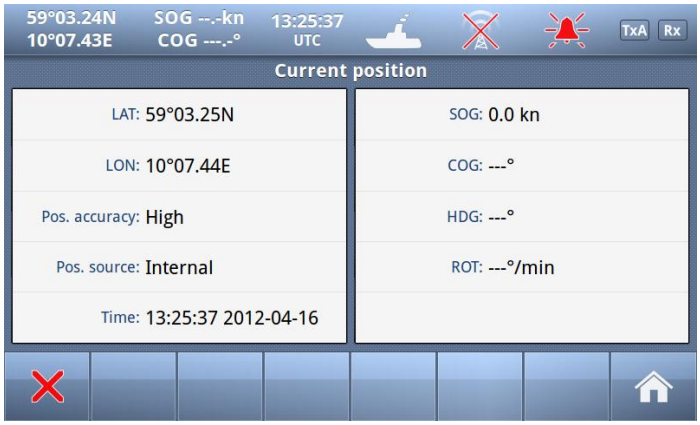
- Display unit firmware
- Transponder unit firmware

NOTE: Update of Firmware shall only be done by Jotron trained dealers, distributors & service agents.

10.2.8 Current position



Red square shows 
button selected to get to next menu



The “Current position” will show information about:

- Latitude
- Longitude
- Pos Accuracy (High/Low)
- Pos Source (Internal/External)
- Time & Date
- SOG (Speed over Ground)
- COG (Course Over Ground))
- HDG (Heading)
- ROT (Rate Of Turn)

11 Menu tree

Configuration menu

- Own Ship data (Name, MMSI, IMO number, Antenna Position, Type of Vessel)
- Display Settings (Sleeping targets)
- Regions
    - Add region
    - View regions
- Alarms
- Indicators
- Advanced
    - Interface
        - Display/Transponder IP
        - External Display
        - Aux. Display/Pilot Port
        - Baud rate
        - Priorities
        - Port Monitor (monitor sensor connections)
    - VHF link / Long Range
    - CPA/TCPA settings
    - Internal GPS
    - History
    - Self Test
    - System (System information, serial no. and revisions)
        - Change Passwords
        - Update firmware
    - Current Position

Safety Message Menu

- Toggle between sent and received messages
- Write New message
- Select message in list (up and down arrows)
- Resend a selected Sent message (if any) or reply on a selected Received message (if any)

Display options

- Day / Night mode
- Dimming

Voyage Data

- Configuration of Navigation Status, Destination, ETA, Draught, Cargo category and number of Persons aboard.

12 List of VHF Channels

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
6	156.3000	1021	157.0500	1279	156.9775	2219	161.5625
8	156.4000	1022	157.1000	1280	157.0375	2220	161.6125
9	156.4500	1023	157.1500	1281	157.0875	2221	161.6625
10	156.5000	1024	157.2000	1282	157.1375	2222	161.7125
11	156.5500	1025	157.2500	1283	157.1875	2223	161.7625
12	156.6000	1026	157.3000	1284	157.2375	2224	161.8125
13	156.6500	1027	157.3500	1285	157.2875	2225	161.8625
14	156.7000	1028	157.4000	1286	157.3375	2226	161.9125
15	156.7500	1060	156.0250	1287	158.3875	2227	161.9625
16	156.8000	1061	156.0750	2001	160.6500	2228	162.0125
17	156.8500	1062	156.1250	2002	160.7000	2260	160.6375
67	156.3750	1063	156.1750	2003	160.7500	2261	160.6875
68	156.4250	1064	156.2250	2004	160.8000	2262	160.7375
69	156.4750	1065	156.2750	2005	160.8500	2263	160.7875
70	156.5250	1066	156.3250	2007	160.9500	2264	160.8375
71	156.5750	1078	156.9250	2018	161.5000	2265	160.8875
72	156.6250	1079	156.9750	2019	161.5500	2266	160.9375
73	156.6750	1080	157.0250	2020	161.6000	2278	161.5375
74	156.7250	1081	157.0750	2021	161.6500	2279	161.5775
75	156.7750	1082	157.1250	2022	161.7000	2280	161.6375
76	156.8250	1083	157.1750	2023	161.7500	2281	161.6875
77	156.8750	1084	157.2250	2024	161.8000	2282	161.7375
208	156.4125	1085	157.2750	2025	161.8500	2283	161.7875
209	156.4625	1086	157.3250	2026	161.9000	2284	161.8375
210	156.5125	1087	157.3750	2027	161.9500	2285	161.8875
211	156.5625	1088	157.4250	2028	162.0000	2286	161.9375
212	156.6125	1201	156.0625	2060	160.6250	2287	161.9875
213	156.6625	1202	156.1125	2061	160.6750		
214	156.7125	1203	156.1625	2062	160.7250		
215	156.7625	1204	156.2125	2063	160.7750		
216	156.8125	1205	156.2625	2064	160.8250		
217	156.8625	1206	156.3125	2065	160.8750		
267	156.3875	1207	156.3625	2066	160.9250		
268	156.4375	1218	156.9125	2078	161.5250		
269	156.4875	1219	156.9625	2079	161.5750		
270	156.5375	1220	157.0125	2080	161.6250		
271	156.5875	1221	157.0625	2081	161.6750		
272	156.6375	1222	157.1125	2082	161.7250		
273	156.6875	1223	157.1625	2083	161.7750		
274	156.7375	1224	157.2125	2084	161.8250		
275	156.7875	1225	157.2625	2085	161.8750		
276	156.8375	1226	157.3125	2086	161.9250		
277	156.8875	1227	157.3625	2087	161.9750		
1001	156.0500	1228	157.4125	2088	162.0250		
1002	156.1000	1260	156.0375	2201	160.6625		
1003	156.1500	1261	156.0875	2202	160.7125		
1004	156.2000	1262	156.1375	2203	160.7625		
1005	156.2500	1263	156.1875	2204	160.8125		
1007	156.3500	1264	156.2375	2205	160.8625		
1018	156.9000	1265	156.2875	2206	160.9125		
1019	156.9500	1266	156.3375	2207	160.9625		
1020	157.0000	1278	156.9375	2218	161.5125		

Channel 2087 = Channel 87B Channel 2088 = Channel 88B

13 Complied Standards

The TR-8000 AIS system complies with the following standards:

IMO Resolution MSC.694(17) – *General Requirements for Shipborne Radio Equipment forming part of the Global Maritime Distress and Safety System (GMDSS) and for Electronic Navigational Aids*

IMO Resolution MSC.74(69) *Annex 3 Recommendation on performance standards for AIS*

IMO Resolution MSC.191(79) – *Performance standards for the presentation of navigation related information on shipborne navigational displays*

ITU-R M.1371-4 (Class A), 2010 – *Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band*

ITU-R M.825-3, 1998 - *Characteristics of a transponder system using digital selective calling techniques for use with vessel traffic services and ship-to-ship identification*

ITU-R M.1084-4 – *Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime band*

IEC 61993-2,2001 - *Maritime navigation and radio communication equipment and systems – Automatic Identification Systems (AIS), Part 2: Class A ship borne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required results*

IEC 61108-1 Ed.2, 2003 – *Maritime navigation and radio communication equipment and systems – Global navigation satellite systems (GNSS)*

IEC 62288 Ed.1, 2008 – *Maritime navigation and radio communication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results*

IEC 61162-1 Ed.4, 2010 - *Maritime navigation and radio communication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 61162-2 Ed.1, 1998 - *Maritime navigation and radio communication equipment and systems – Digital interfaces – Part 2: Single talker and multiple listeners, high-speed transmission*

IEC 60945 Ed.4, 2002 incl. Corr.1, 2008 – *Maritime navigation and radio communication equipment and systems – General requirements – Method of testing and required test results*

14 Outline Drawings

14.1 TR-8000 Transponder Unit

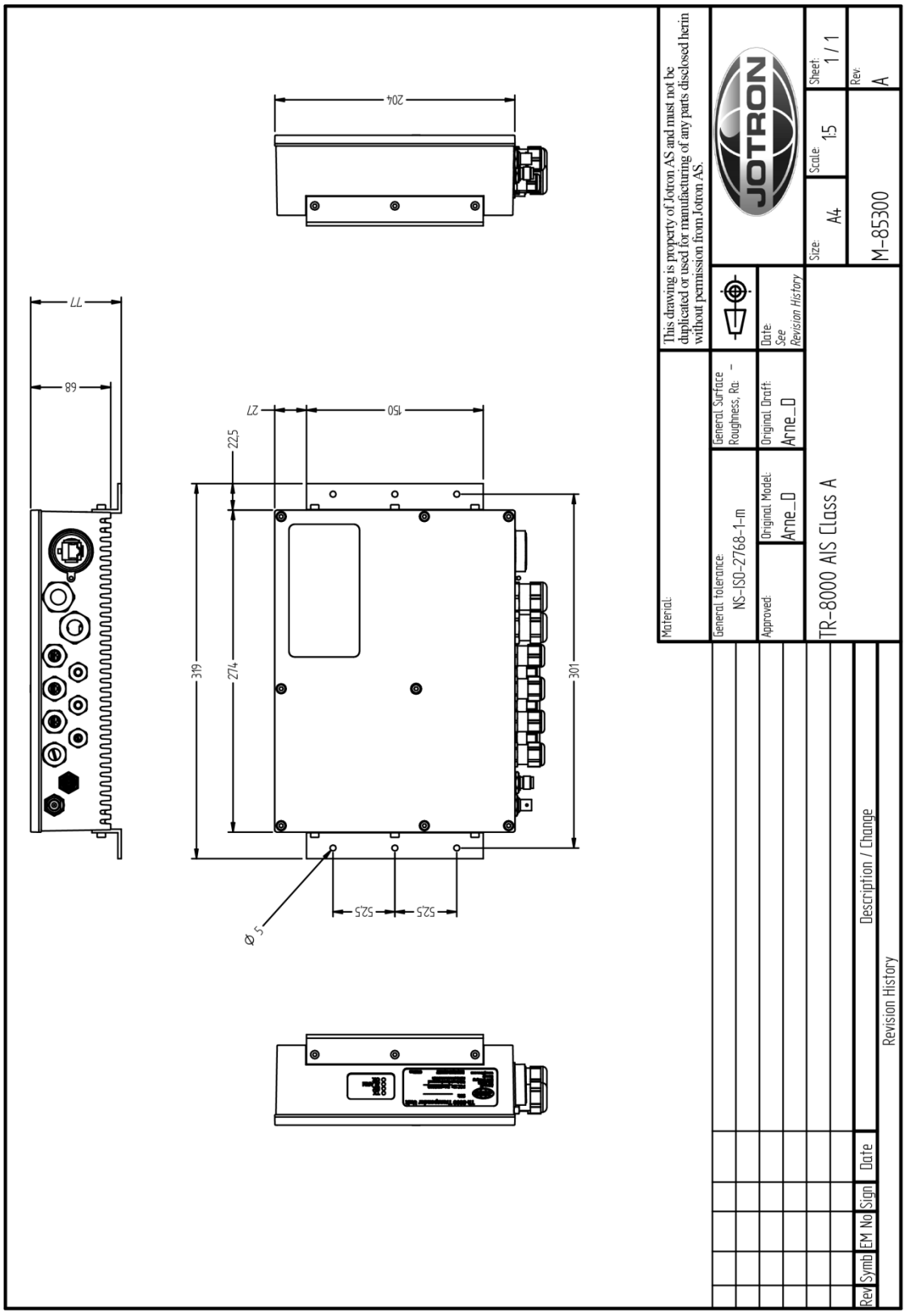


Figure 14-1 TR-8000 Transponder Unit- mechanical dimensions

14.2 TR-8000 Display Unit, Desktop or Overhead mount

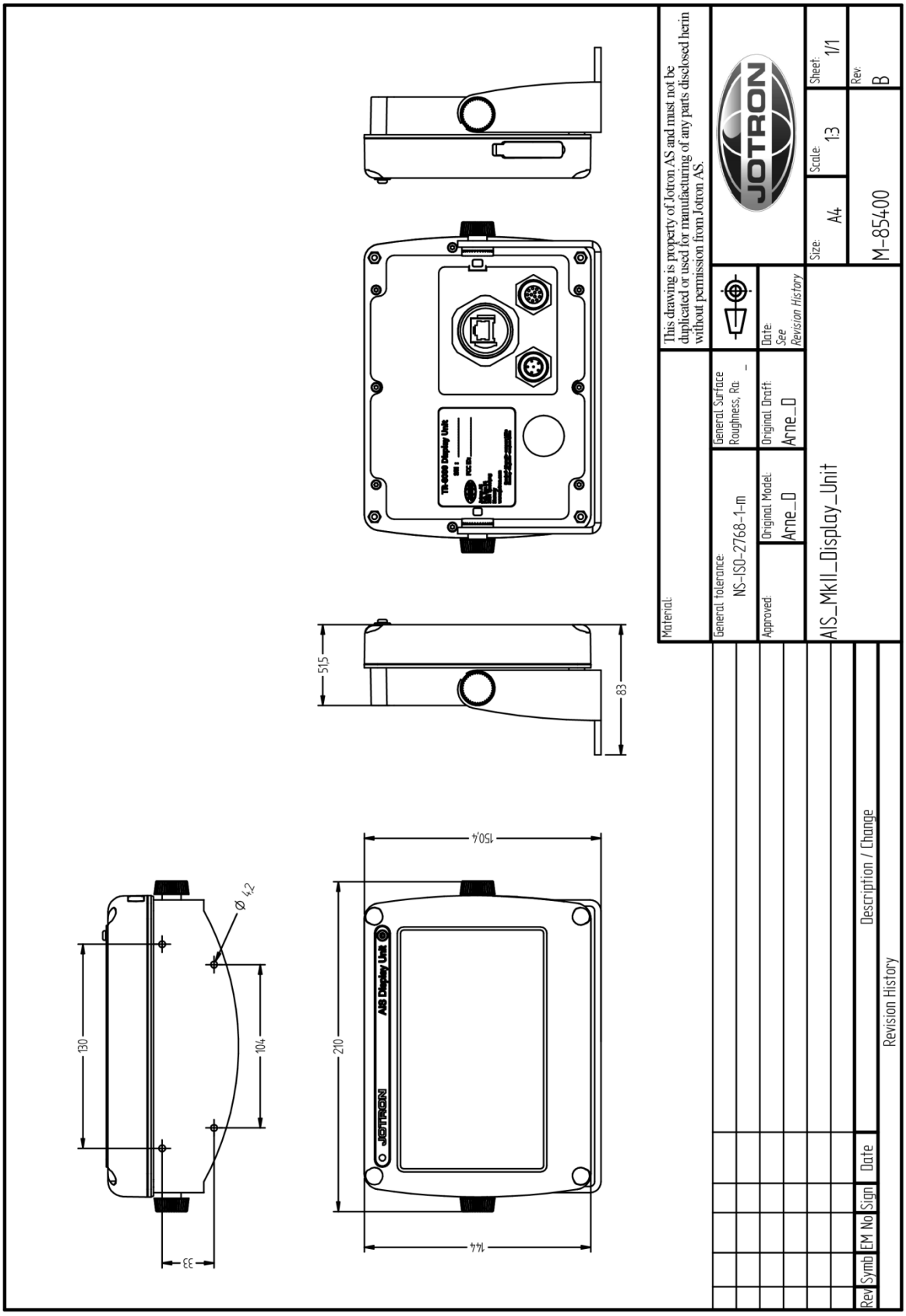
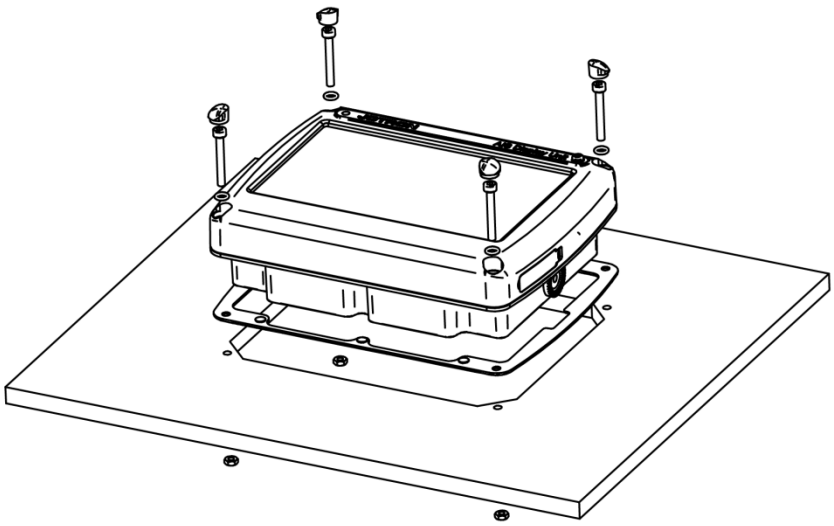
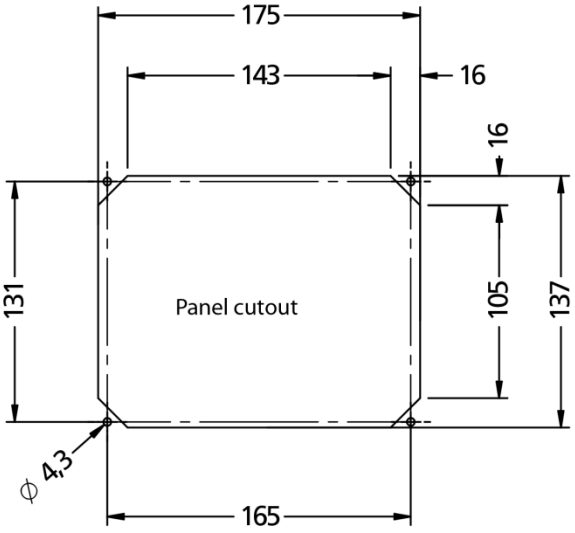


Figure 14-2 TR-8000 Display Unit- Mechanical Dimensions

14.3 TR-8000 Display Unit, Flush/Panel mount



Flush mounted Display unit, exploded view.



Panel cutouts and holes dimensions for flush mounting of the Display unit. All dimensions are in mm.

Material:						This drawing is property of Jotron AS and must not be duplicated or used for manufacturing of any parts disclosed herin without permission from Jotron AS.		
						General tolerance: NS-ISO-2768-1-m	General Surface Roughness, Ra: _	JOTRON
						Approved:	Original Model: Arne_D	Original Draft: Arne_D	Date: See Revision History	
						Cut-out AIS - Display	Size: A4	Scale: 1:3	Sheet: 1/1
Rev	Symb	EM No	Sign	Date	Description / Change		85400_cut-out	Rev: A
Revision History								

Figure 14-3 TR-8000 Display Unit - Flush Mount Cutout dimensions

14.4 AIS Antenna Splitter

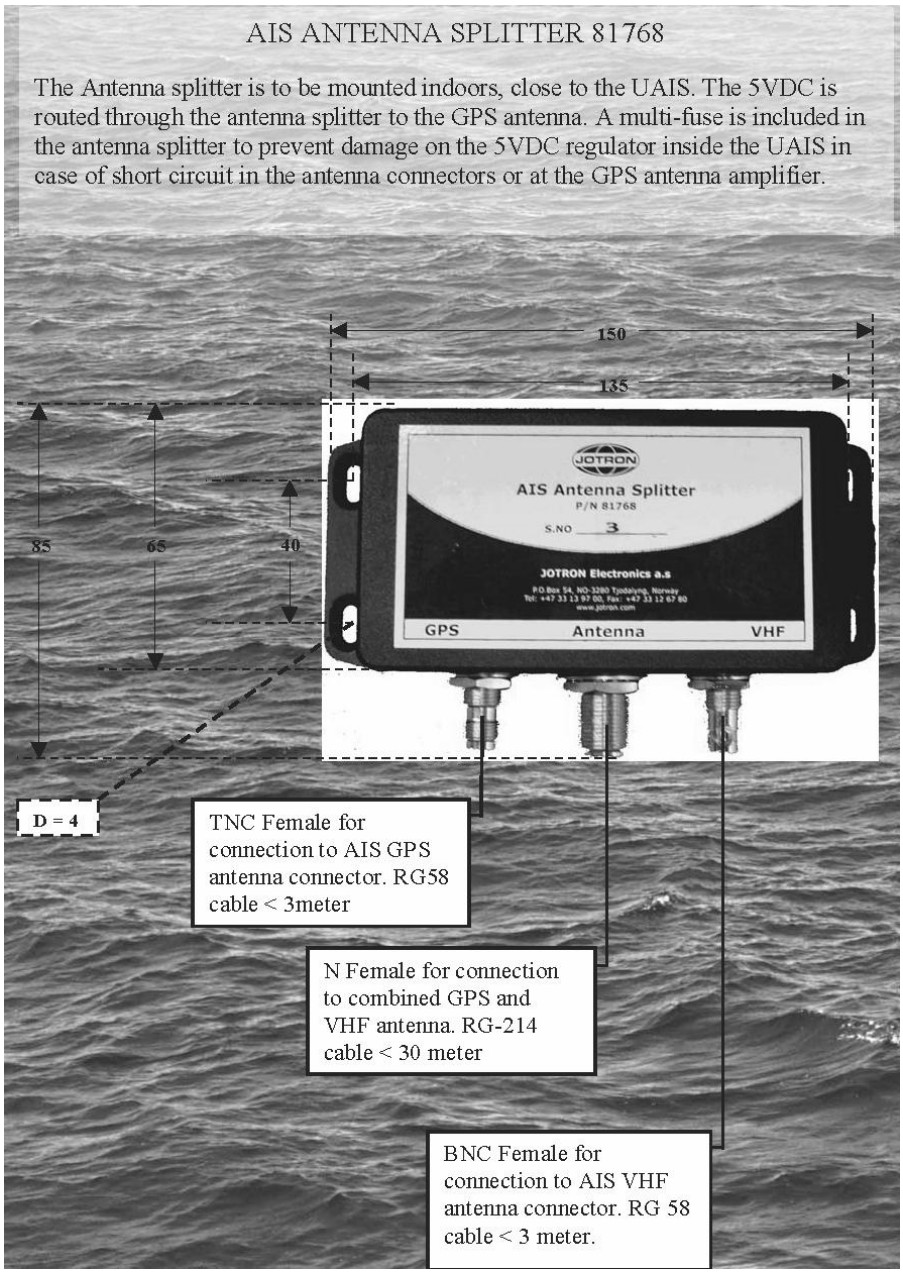
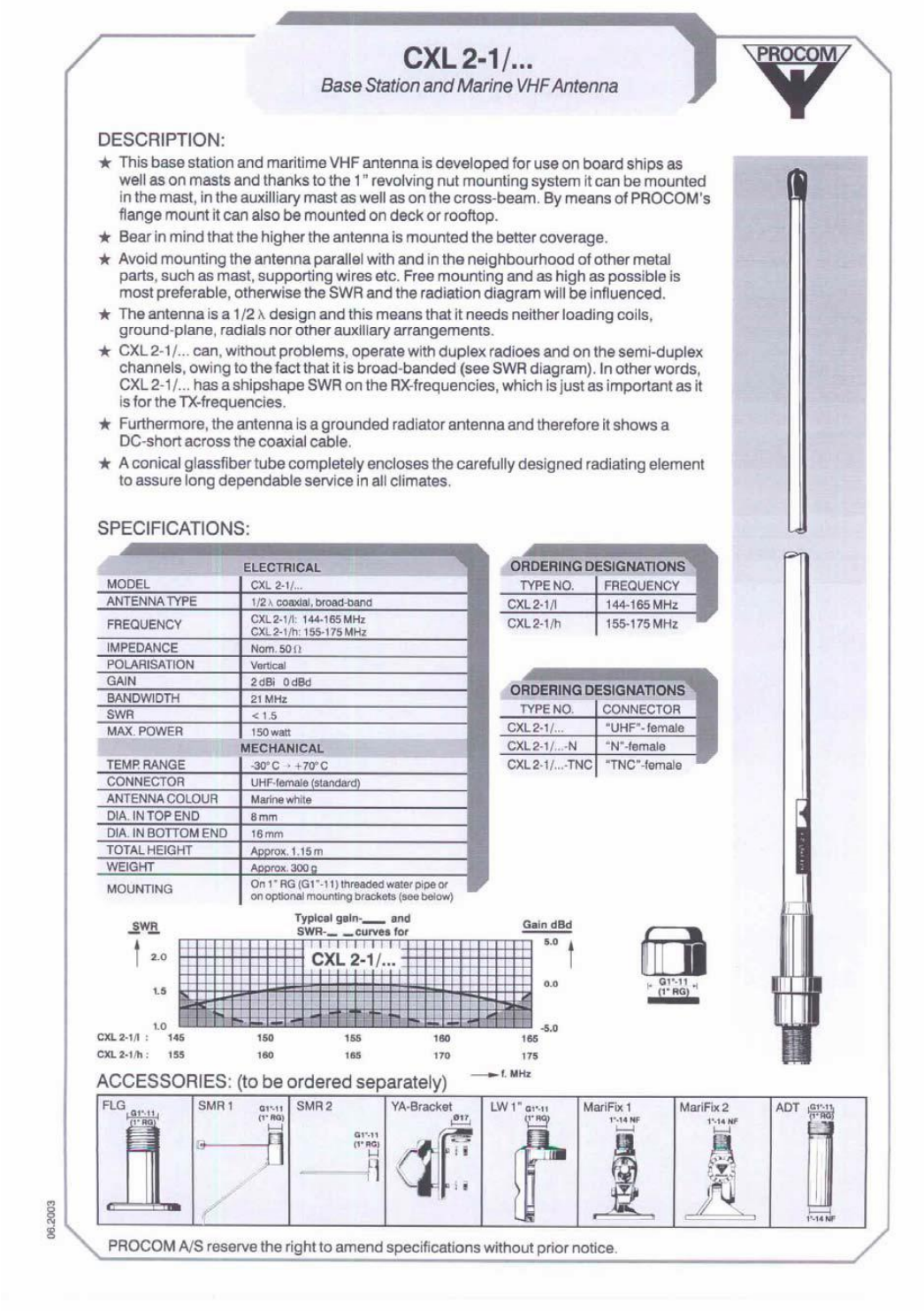


Figure 14-4 AIS Antenna Splitter Datasheet

14.5 Procom CXL 2-1LW/h Maritime VHF Antenna



CXL 2-1/...

Base Station and Marine VHF Antenna

PROCOM

DESCRIPTION:

- ★ This base station and maritime VHF antenna is developed for use on board ships as well as on masts and thanks to the 1" revolving nut mounting system it can be mounted in the mast, in the auxilliary mast as well as on the cross-beam. By means of PROCOM's flange mount it can also be mounted on deck or rooftop.
- ★ Bear in mind that the higher the antenna is mounted the better coverage.
- ★ Avoid mounting the antenna parallel with and in the neighbourhood of other metal parts, such as mast, supporting wires etc. Free mounting and as high as possible is most preferable, otherwise the SWR and the radiation diagram will be influenced.
- ★ The antenna is a 1/2 λ design and this means that it needs neither loading coils, ground-plane, radials nor other auxilliary arrangements.
- ★ CXL 2-1/... can, without problems, operate with duplex radioes and on the semi-duplex channels, owing to the fact that it is broad-banded (see SWR diagram). In other words, CXL 2-1/... has a shipshape SWR on the RX-frequencies, which is just as important as it is for the TX-frequencies.
- ★ Furthermore, the antenna is a grounded radiator antenna and therefore it shows a DC-short across the coaxial cable.
- ★ A conical glassfiber tube completely encloses the carefully designed radiating element to assure long dependable service in all climates.

SPECIFICATIONS:

	ELECTRICAL
MODEL	CXL 2-1/...
ANTENNA TYPE	1/2 λ coaxial, broad-band
FREQUENCY	CXL 2-1/l: 144-165 MHz CXL 2-1/h: 155-175 MHz
IMPEDANCE	Nom. 50 Ω
POLARISATION	Vertical
GAIN	2 dBi 0 dBd
BANDWIDTH	21 MHz
SWR	< 1.5
MAX. POWER	150 watt
	MECHANICAL
TEMP. RANGE	-30° C › +70° C
CONNECTOR	UHF-female (standard)
ANTENNA COLOUR	Marine white
DIA. IN TOP END	8 mm
DIA. IN BOTTOM END	16 mm
TOTAL HEIGHT	Approx. 1.15 m
WEIGHT	Approx. 300 g
MOUNTING	On 1" RG (G1"-11) threaded water pipe or on optional mounting brackets (see below)

ORDERING DESIGNATIONS

TYPE NO.	FREQUENCY
CXL 2-1/l	144-165 MHz
CXL 2-1/h	155-175 MHz

ORDERING DESIGNATIONS

TYPE NO.	CONNECTOR
CXL 2-1/...	"UHF"-female
CXL 2-1/...-N	"N"-female
CXL 2-1/...-TNC	"TNC"-female

ACCESSORIES: (to be ordered separately)

PROCOM A/S reserve the right to amend specifications without prior notice.

06.2003

Figure 14-5 Procom CXL 2-1 VHF Antenna datasheet

14.6 Procom GPS 4 Antenna

GPS 4/...

Active Receiving Antenna for the 1575 MHz NAVSTAR GPS Satellite Navigational System

PROCOM

DESCRIPTION:

- ★ Full hemispherical coverage due to quadrifilar helix antenna element.
- ★ Built-in high gain, low noise amplifier.
- ★ Input filter for thorough RF-overload protection.
- ★ Right-hand circular polarisation (RHCP).
- ★ High rejection of cross-polarised reflections prevents fading caused by multipath propagation.
- ★ Choice between 5 V or 12 V supply voltage.
- ★ DC supply via RF-connector.
- ★ EMC tested to IEC 801 and IEC 255.
- ★ Total design carried out to make the antenna withstand tough environments.
- ★ Comprehensive range of accessory mounting brackets available.

AIS

SPECIFICATIONS:

ELECTRICAL General specifications	
ANTENNA TYPE	Quadrifilar helix active antenna
FREQUENCY	1575 MHz
IMPEDANCE	Nom. 50 Ω
POLARISATION	Circular right-hand
COVERAGE	Hemispherical
GAIN (in axial direction)	> 32 dBi
CROSS-POLARISATION ATT.	> 10 dB
Built-in amplifier	
GAIN	> 30 dB
NOISE FIGURE	< 3 dB (incl. input filter). Typ. approx. 2.5 dB
1 dB COMPRESSION POINT	> 10 dBm
SELECTIVITY	> 20 dB down at ± 100 MHz
OUT OF BAND ATTENUATION	0.03– 1 GHz : > 40 dB down 2 –10 GHz : > 40 dB down
SWR (output)	< 2.0
SUPPLY VOLTAGE	GPS 4: 5±0.5 VDC GPS 4/12V: 9–15 VDC
CURRENT CONSUMPTION	Approx. 44 mA
EMC	Full protection (IEC 801, IEC 255)
MECHANICAL	
MATERIALS	Antenna dome: Weather-resistant low-loss plastic
ANTENNA COLOUR	Marine white
INSULATION	Connector ground terminal is galvanically insulated from the mounting hardware
WIND SURFACE	Approx. 0.0072 m²
MAX. WIND SPEED	200 km/h
WIND LOAD	Approx. 9.6 N (at 150 km/h)
TEMP. RANGE	-30° C ~ + 70° C
CONNECTOR	FME-male (pin)
SUGGESTED DOWNLEAD CABLE	< 10 m : RG 58 > 10 m : RG 213
TOTAL HEIGHT	Approx. 23 cm
WEIGHT	Approx. 150 g
MOUNTING	On 1" water pipe or on PROCOM 1" mounting brackets (see accessories below)

PROCOM DENMARK

GPS 4

MODEL SURVEY:

TYPE NO.	SUPPLY VOLTAGE
GPS 4	5 V DC (4.5–5.5 V)
GPS 4/12 V	12 V DC (9–15 V)

ACCESSORIES:

FLG GPS-11 (1" RG)

PROCOM A/S reserve the right to amend specifications without prior notice.

Figure 14-6 Procom GPS4 Antenna datasheet

14.7 SANAV – GPS Marine Antenna

Figure 14-7 Sanav SA-200 GPS Antenna

GPS Marine Antenna with Low Noise Amplifier

SA-200 is designed for the Marine Vessels mast or tall buildings that require long extra cables (up to 50 meters) without signal constraint to the GPS receivers.

MODEL: SA-200

Overview

SA-200 is the integration of the high performance GPS patch antenna and a state-of-the-art low noise amplifier into an extremely compact/fully waterproof enclosure and when connected to a GPS receiver with +5VDC antenna power it can provide excellent antenna signal amplification and out-band filtering with rejection for that receiver.

Specification

Physical Constructions:	
Constructions:	Polycarbonate radome enclosure (top & bottom base with rubber O-ring inbetween) Center feeds TNC connector for antenna output
Dimensions:	4.5" in diameter & 2.9" in height
Weight:	220 grams (without cable)
Standard Mounting:	External flagpole mount (11cm-height threaded mast), an optional accessory kit
Optional mounting plate:	1. Cabin roof-mount with stainless steel base & shaft 2. Rail side mount with stainless rod

14.8 AC Marine VHF/GPS-B

VHF/GPS-B

GPS Marine Antenna

VHF/GPS-B is a VHF marine antenna with a helix GPS antenna for the frequency 1575.42 MHz incorporated. The VHF/GPS-B is manufactured in premium quality materials in order to prevent galvanic corrosion.

VHF/GPS-B is subject for improvement at all times. The antenna has the same rugged design as all other AC Marine antennas thus it withstands harsh environmental conditions.

Electrical specifications:	
Frequency range (MHz)	156.0-162.5/1575.42
Nominal impedance (ohm)	50
Power for GPS 35W (VDC)	3.0-5.0
Gain (dB)	VHF: 0 / GPS: 18
Connector	N-female

Mechanical specifications:	
Length (m/ft)	1.1/3.6
Weight (kg/lbs)	0.65/1.43
Wind rating (m/s/mph)	45/101
Material	Polyurethane lacquer
Colour	White
Temperature range (°C/°F)	-40 to +60 / -40 to +140

Mounting:
N240F mount included.
Can be used with all standard AC Marine mounting equipment.

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acmarine@acmarine.dk · www.acmarine.dk

Version, 26.09.2011

Figure 14-8 AC Marine VHF/GPS-B Combined Antenna datasheet

15 Abbreviations and Definitions

ACK	Acknowledge
AIS	Automatic Identification System - A shipborne broadcast transponder system in which ships continually transmit their position, course, speed and other data to other nearby ships and shoreline authorities on a common VHF radio channel.
AIS-SART	Automatic Identification System-Search And Rescue Transponder
AtoN	Aid to Navigation
BAUD	Transmission rate unit of measurement for binary coded data (bit per second).
BNC	Bayonet Neill-Concelman connector – common type of RF connector used for coaxial cable
BRG	Bearing
CPA	Closest Point of Approach
COG	Course Over Ground – Course made good relative to the sea bed.
DSC	Digital Selective Calling
DGNSS	Differential GNSS
DGPS	Differential GPS – A method of refining GPS position solution accuracy by modifying the locally computed position solution with correction signals from an external reference GPS CDU (monitor).
ECDIS	Electronic Chart Display and Information System for navigation approved to be used without paper charts
ECS	Electronic Chart System
EPFS	Electronic Position Fixing System (GPS is mostly used)
ETA	Estimated Time of Arrival. Calculated on basis of the distance to the destination and the current (or estimated) speed.
FM	Frequency Modulation - The method by which a signal offsets the frequency in order to modulate it on a data link.
GNSS	Global Navigation Satellite System – A common label for satellite navigation systems (such as GPS and GLONASS).
GPS	Global Positioning System – The NAVSTAR Global Positioning System, which consists of orbiting satellites, a network of ground control stations, and user positioning and navigation equipment. The system has 24 satellites plus 3 active spare satellites in six orbital planes about 20,200 kilometers above the earth.
GLONASS	A satellite navigation system developed and operated by Russia.

GMT Greenwich Mean Time

GMDSS Global Maritime Distress Safety System

HDG Heading - The direction, in which the vessel is pointed, expressed as angular distance from north clockwise through 360 degrees. HEADING should not be confused with COURSE. The HEADING is constantly changing as the vessel yaws back and forth across the course due to the effects of sea, wind, and steering error.

IALA International Association of Marine Aids to Navigation and Lighthouse Authorities

IEC International Electro-technical Commission

IEC 61162-1 Maritime navigation and radio communication equipment and systems – Digital interfaces Single Talker- Multiple listeners: Closely related to NMEA0183 version 2.3, communication at 4800 baud. Definition of both electrical interface and protocol to be used.

IEC 61162-2 Maritime navigation and radio communication equipment and systems – Digital interfaces Single Talker- Multiple listeners, High speed transmission: Closely related to NMEA0183HS version 2.3, communication at 34800 baud. Definition of both electrical interface and protocol to be used.

IMO International Maritime Organization

IP Internet Protocol (**IP**) is the central, unifying protocol in the TCP/IP suite. It provides the basic delivery mechanism for packets of data sent between all systems on an internet, regardless of whether the systems are in the same room or on opposite sides of the world. All other protocols in the TCP/IP suite depend on IP to carry out the fundamental function of moving packets across the internet.

ISGOTT International Safety Guide for Oil Tankers and Terminals

ITU International Telecommunication Union

LAN Local Area Network

LED Light Emitting Diode

LCD Liquid Crystal Display

LR Long Range

NMEA National Marine Electronics Association – The NMEA electronics interface specifications have been developed under the auspices of the Association. The NMEA 0183 is an internationally recognized specification for interfacing marine electronics. NMEA 0183 version 2.3 is almost identical to lEC 61162-1.

MKD Minimum Keyboard and Display

MMSI Maritime Mobile Service Identity

RCC Rescue Coordination Centre

RF Radio Frequency

RMS ROOT MEAN SQUARED – A statistical measure of probability stating that an expected event will happen 68% of the time. In terms of position update accuracy, 68 position updates out of 100 will be accurate to within specified system accuracy.

ROT Rate Of Turn

RNG Range

RX RX is the telegraph and radio abbreviation for “receive”

SAR Search And Rescue

S/N Signal-to-Noise ratio (SIN). Quantitative relationship between the useful and non-useful part of the received satellite signal. A high SIN indicates a good receiving condition.

SOG Speed Over Ground – Speed in relation to the seabed.

SOTMA Self Organized Time Division Multiple Access -An access protocol, which allows autonomous operation on a data link while automatically resolving transmission conflicts.

TCP Transmission Control Protocol – Provides a reliable byte-stream transfer service between two end points on an internet. TCP depends on IP to move packets around the network on its behalf.

TCP/IP TCP/IP is a name given to the collection (or ***suite***) of networking protocols that have been used to construct the global Internet. The protocols are also referred to as the **DoD** (***dee-oh-dee***) or **Arpanet** protocol suite because their early development was funded by the Advanced Research Projects Agency (**ARPA**) of the US Department of Defense (**DoD**).

TCPA Time to Closest Point of Approach

TI Turn Indicator

TNC Threaded Neill-Concelman connector – common type of RF connector used for coaxial cable

TX TX is the telegraph and radio abbreviation for “transmit”

UDP User Datagram Protocol – Provides a packetized data transfer service between end points on an internet. UDP depends on IP to move packets around the network on its behalf.

UTC Universal Time Coordinated – Greenwich mean time corrected for polar motion of the Earth and seasonal variation in the Earth's rotation.

VDC Volt DC

VDL VHF Data Link

VHF Very High Frequency – A set of frequencies in the MHz region

VSWR Voltage standing wave ratio

16 Service Procedure

WARRANTY CLAIM

Warranty claims are valid until 2 years from delivery from our warehouse. The warranty is valid as long as service is carried out by authorized Jotron distributors or agents.
All products are warranted against workmanship and factory defect, in material. Any warranty claims must be sent to Jotron, in writing.

Jotron reserve the right to decide whether a defective unit is within warranty terms and conditions.

If Jotron make a decision of repairing a defective product, a written description of the claim and a Jotron RMA number, should follow the unit when returning it back to Jotron's factory.

Please be noted that un-protective electronics board MUST be packed in antistatic bag, before returning to Jotron's factory.

Any costs related to transportation and/or workmanship linked up to the return of the product being repaired shall be covered by the customer.

Jotron's obligations during warranty replacement;
Replace defective unit, including any programming
Delivery terms: DAP Incoterms 2010 by regular freight to "Place" (Airport)

Service agent's obligations during warranty claims:
Supply replacement unit from own stock if available
If agreed, return defective unit to Jotron
Electronic units must be shipped in antistatic bags or covered with Jotron's plastic cover

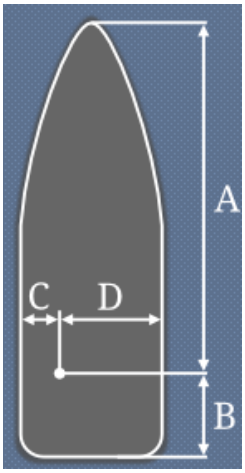
SERVICE – NOT WARRANTY CLAIM

Service, such as testing, installation, programming, replacement is provided by an authorized Jotron service agent. Jotron do not meet the cost for services mentioned above. Distributor or service agent should stock the most commonly needed spare parts.

16.1 Tron TR-8000 AIS Installation – registration form

Vessel name		**IMO Number**	
Flag State		**MMSI Number**	
Owner / Company		**Radio Call Sign**	
On-Board Contact Name		**Telephone Number(s)**	Office:
			GSM:
Superintendents Name		**Telephone Number(s)**	Office:
			GSM:
Type of Vessel		**Gross Registered Tonnage**	GWT
L.O.A.	mtrs	**Beam**	mtrs
Comments:			

TR-8000 Transponder unit, serial number:	
TR-8000 Display unit, serial number:	



Antenna Location	**GNSS Antenna connected to External Position Source**	**GNSS Antenna connected directly to TR-8000 (Internal)**
A=Distance to Bow	mtrs	mtrs
B=Distance to Stern	mtrs	mtrs
C=Distance to Port Side	mtrs	mtrs
D=Distance to Starboard side	mtrs	mtrs

Installation completed and successfully commissioned by:

Technician, (type name)		
Service provider / company		
Place	Date	Signature

Please fill in with capital letters

This form must be sent to Jotron AS, beacon@jotron.com or Fax.: + 47 33 12 67 80
(Att: Service department) in order to have a valid 24 months product warranty

16.2 Trouble Description Form

For better to help you if your system fails, please give as much information as possible in the following tables:

Transponder Unit Information	**Information from System Menu**
Serial number	
Software version	
Model code	
Hardware revision	

Display Unit Information	**Information from System Menu**
Serial number	
Software version	
SVN revision	
Hardware revision	

Transponder Unit Connections:	**Equipment:**
Sensor 1	
Sensor 2	
Sensor 3	
Ext Display Port (RS-422/RS-232/LAN)?	
Pilot Port	
Long Range Port	
DGNSS Data Port	

Display Unit Connections:	**Equipment:**
Pilot Port	

Trouble Description:

17 SERVICE AGENTS

Please look at www.jotron.com for Marine Service Agents.

18 List of Figures

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