

Saab TransponderTech

R5 SUPREME AIS Transponder System



OPERATION & INSTALLATION MANUAL



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iii Software

This manual reflects the capabilities of the R5 SUPREME AIS Transponder with Software version 1.4.1 and R5 SUPREME Control & Display Unit (CDU) with software version 1.4.1.

If the system since delivery has been updated from this version, such change should be reflected on a label on the unit. Current software versions in the system can always be verified in the S/W info dialog as described in section 6.25.

iv Manual Part Number and Revision

Part number 7000 118-300, revision L1.

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vi Contact Information

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R5 SUPREME AIS System



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1 SAFETY INSTRUCTIONS

1.1 General

Saab AB (publ), TransponderTech assumes no liability for customer not complying with requirements in this section or warnings and cautions elsewhere in this document.

This safety instruction section refers to all components of the R5 SUPREME AIS System, referred to as "equipment" in this section.

1.2 Installation and Service

Only qualified technicians shall do installation and servicing of equipment. Electrical fuses must be replaced with correct types.

To prevent electrical chock hazard and damage to the equipment, the equipment shall be connected to electrical ground. A power supply corresponding to the voltage rating of the equipment shall be used. Failure to comply with this requirement may damage the equipment.

To ensure proper functioning of the equipment, only signal cables and antennas specified in this document may be used. Failure to comply with this requirement may cause unexpected behavior of the equipment.

The equipment may not in any way be modified; doing so may cause fire, shock hazard or serious injury.

1.3 Operational safety guideline

AIS has become a very powerful tool in assisting safe navigation, as more and more vessels are equipped with AIS systems. AIS can enable vessel identification and positioning, enhancing navigational safety.

However, it is important to know that:

- AIS information is only as good as the input it gets. Should any input to the AIS malfunction and provide incorrect data (such as Heading, ROT, COG, SOG, Position), this data may still be reported to nearby vessels. The mariner should therefore be aware that received AIS data could be incorrect.
- Consider that not all vessels are equipped with "true" AIS. Some users may use internet services for reception of AIS data, and may experience data delays and dropouts.
- Smaller vessels are more likely not to have AIS at all.
- Each Voyage requires updating of Voyage related AIS settings

Considering this, it is important to use multiple sources of information for decision-making.

To ensure proper operation of the Saab AIS system, make sure to view the Alert list for any irregularities in system operation and verify any voyage settings are correct.

Further, in many cases there is a carriage requirement that a Class A AIS system must be installed and fully operating on the vessel. Some administrations may allow the AIS to be switched off when continual operation of AIS compromise the safety or security of the vessel or where a security incident is imminent. Turning off the AIS will result in a Non Functioning Time log entry.



1.4 Compass Safe Distances

Equipment	Standard magnetic compass	Steering magnetic compass
R5 SUPREME Transponder	0.65 m	0.40 m
R5 SUPREME CDU	0.75 m	0.50 m



2 THE AUTOMATIC IDENTIFICATION SYSTEM

The Automatic Identification System (AIS) is a safety information system that was proposed as a worldwide standard in 1997 and adopted by IMO in 1998. The AIS system is standardized by ITU, IEC, IALA and IMO and is subject to approval by a certification body. The first type approved AIS transponder in the world was Saab TransponderTech's R3 Class A Transponder in 2002.

AIS allows transceivers to automatically share static and dynamic data such as ship name, call sign, dimensions, position and sensor information on two dedicated data links in the upper marine VHF band. There are a number of different AIS devices that can send and receive information on the AIS data link:

- **Class A Transponder** – This type of transponder is used on open sea waters and is mandatory for ships of 300 gross tonnage or more on international voyages, all cargo ships of 500 gross tonnage or more and on passenger ships.
- **Class B Transponder** – Used on smaller vessels and pleasure crafts. It transmits with a lower power than the class A transponder and has lower priority on the data link.
- **Base Station** – Fixed shore station that is typically connected to an AIS network to collect information from all vessels at a certain port or shore line.
- **Repeater Stations** – Used to extend coverage range by repeating incoming messages. Can be implemented as a function in an AIS Base station or an AtoN station.
- **SAR (Search and Rescue) Transponder** – Used on airplanes and helicopters in search and rescue missions.
- **AtoN (Aids to Navigation)** – A transceiver that is fitted on buoys and lighthouses in order to send information about their positions.
- **Inland AIS** – A European standardized extension to Class A systems for use on inland water ways. An inland transponder has additional messages to communicate with bridges, ports and locks and can also send some additional information that are useful on water ways such as blue sign indication, specific hazardous cargo etc.
- **Locating Devices** – Emergency and distress location transmitters e.g. AIS-SART, EPIRB-AIS and MOB-AIS. An active Locating device unit will always be sorted on top of the target list in the R5 SUPREME CDU to accentuate its presence.



3 SYSTEM OVERVIEW

3.1 Product Description

The basic R5 SUPREME AIS Transponder System consists of three parts

- The R5 SUPREME Transponder
- The R5 SUPREME Control and Display Unit (CDU)
- The R5 AIS Junction Box

The R5 SUPREME Transponder is a Class A unit that consists of a transceiver radio unit, a 50 channel GPS receiver, and a controller unit. The radio has three receivers, two tuneable TDMA receivers and one DSC receiver. The transmitter alternates its transmissions between the two operating TDMA channels. The controller unit creates and schedules data packets (containing dynamic, static and voyage related data) for transmission based on the IMO performance standard for AIS.

The R5 SUPREME CDU is the AIS configuration and display unit. The colour LCD together with the resistive touch interface provides a graphical user-friendly interface to the system. The resistive touch panel allows functionality under all weather conditions. Under rough sea, the rubber keypads can be used instead of the touch interface. With the R5 SUPREME CDU it is possible to plot the location of other ships, aids to navigation and search and rescue vessels. The R5 SUPREME CDU can also be used to send and receive messages, perform configuration as well as supervise the R5 SUPREME transponder systems status. The front hatch of the CDU is covering an integrated AIS Pilot Plug connector, as well as USB port and MMC/SD card slot.

Note: The hatch has a screw lock mechanism. It is optional to use this lock. Recommended screwdriver for CDU hatch lock is flat tip 5.5-6.5mm.

The R5 AIS Junction Box allows for easy connection of external equipment to the transponder unit. The R5 SUPREME Transponder shall be connected to the ship's sensors as required by the installation guidelines published by IALA. The R5 SUPREME AIS can interface external navigation and presentation systems that support required IEC 61162-1 sentences. Refer to chapter 10 for more information. The R5 SUPREME AIS is prepared for connection to Long Range systems like Inmarsat C.



4 INSTALLATION

4.1 Unpacking the Equipment

The R5 SUPREME AIS Transponder System consists of the R5 SUPREME transponder, the R5 SUPREME CDU and a number of optional accessories. The most common parts and accessories are listed below. *NOTE: This is not a list of supplied parts, as contents may vary for each order depending on user needs.*

Name	Part number
R5 SUPREME Transponder 7000 118-100 incl. AIS SW 1.4.X	7000 118-540
R5 SUPREME CDU 7000 118-110 incl. SW 1.4.X	7000 118-530
R5 Power Cable 2m	7000 118-077
R5 Signal Cable DSUB-DSUB 2m	7000 118-286
R5 SUPREME Documentation CD <i>Including</i> <i>R5 SUPREME AIS System Manual</i>	7000 118-362 7000 118-300
Printed document set <i>Including:</i> <i>AIS Installation Short Instruction</i> <i>AIS Operator Short Instruction</i> <i>Module B Certificate and DoC</i>	7000 118-360
R5 SUPREME Ethernet Cable 5m.	7000 000-525
R5 AIS Junction box	7000 118-120
GPS antenna options	
MA-700	7000 000-485
AT575-68	7000 000-135
Combined VHF/GPS Antenna	7000 000-435
Antenna GPS mast/rail mount 1" x 14	7000 000-574
Antenna VHF mast/rail mount G1"-11	7000 000-681
AIS Alarm Relay Unit incl. socket	7000 100-132
VHF Antenna BA1012 with mount	7000 000-077
R5 SUPREME CDU Flush mount frame (also for R4 MKD upgrades)	7000 118-367

Table 1 – R5 SUPREME AIS and accessories



4.2 Equipment Installation Environment

The table below lists the IEC 60945 equipment classification for the system.

Name	Part number	IEC 60945 installation category
R5 SUPREME Transponder	7000 118-540	Protected
R5 SUPREME CDU	7000 118-530	Protected
R5 AIS Junction box	7000 118-120	Protected
MA-700	7000 000-485	Exposed
AT575-68	7000 000-135	Exposed
VHF/GPS Antenna	7000 000-435	Exposed

Table 2 - IEC 60945 equipment classification

4.3 Installation Cables

The following cables are needed to install the R5 SUPREME AIS System.

2 x R5 Signal Cable DSUB-DSUB

Marking: 7000 118-286

Type: Shielded Twisted Pair x 0.33 mm²

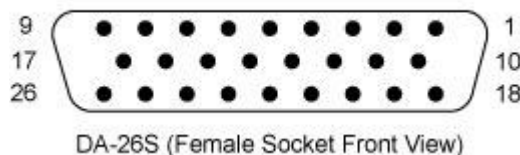
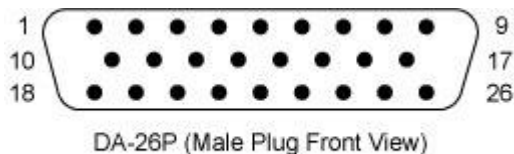
Length: 2 m

Diameter: 11 mm

Connector: 2 x 26-pole H.D.D-SUB (female to male)

Flame retardant: IEC60332-1

Interconnection: Straight connection on all pins.



Note: Two signal cables are used from transponder to junction box, but one is installed in reverse direction (Cable 1: Male → Female. Cable 2: Female → Male)

2 x R5 Power Cable

Type: Unshielded 4 wire cable x 1.3 mm²

Length: 2 m

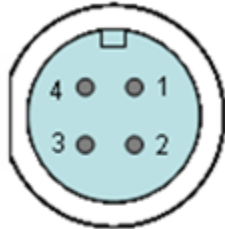
Diameter: 6 mm



Connector: ConXall Mini-Con-X 6382-4SG-311 (female)

Marking: 7000 118-077

Interconnection specification:



Function	Pin	Cable Color
PWR +	1	Red
PWR, GND	2	Black
Ext Switch R	3	Brown
Ext Switch F	4	Orange

R5 SUPREME VHF Antenna Cable

Type and length: See section 4.10.2 VHF Cabling

Connector: BNC (Male)

R5 SUPREME GPS Antenna Cable

Type and Length: See section 4.11.2 GPS Cabling

Connector: TNC (Male)

R5 SUPREME Ethernet Cable

Type: Cat-7, LSZH-FR, IEC 60332-1

Length: 5 m

Diameter: 6.5 mm

Connector: RJ-45

Part number: 7000 000-525

4.3.1 Minimum cable bending radius

When installing the cables the recommended minimum bending radiuses are as follows:

Signal and power cables: 10 times cable diameter

Coaxial cables: 5 times cable diameter



4.4 System interconnection overview

4.4.1 Standard system

Below is a general system setup with everything connected except external sensors and systems, which is connected to the R5 AIS Junction box. For alternate system setups, please see Section 14 “Alternate System Setups”

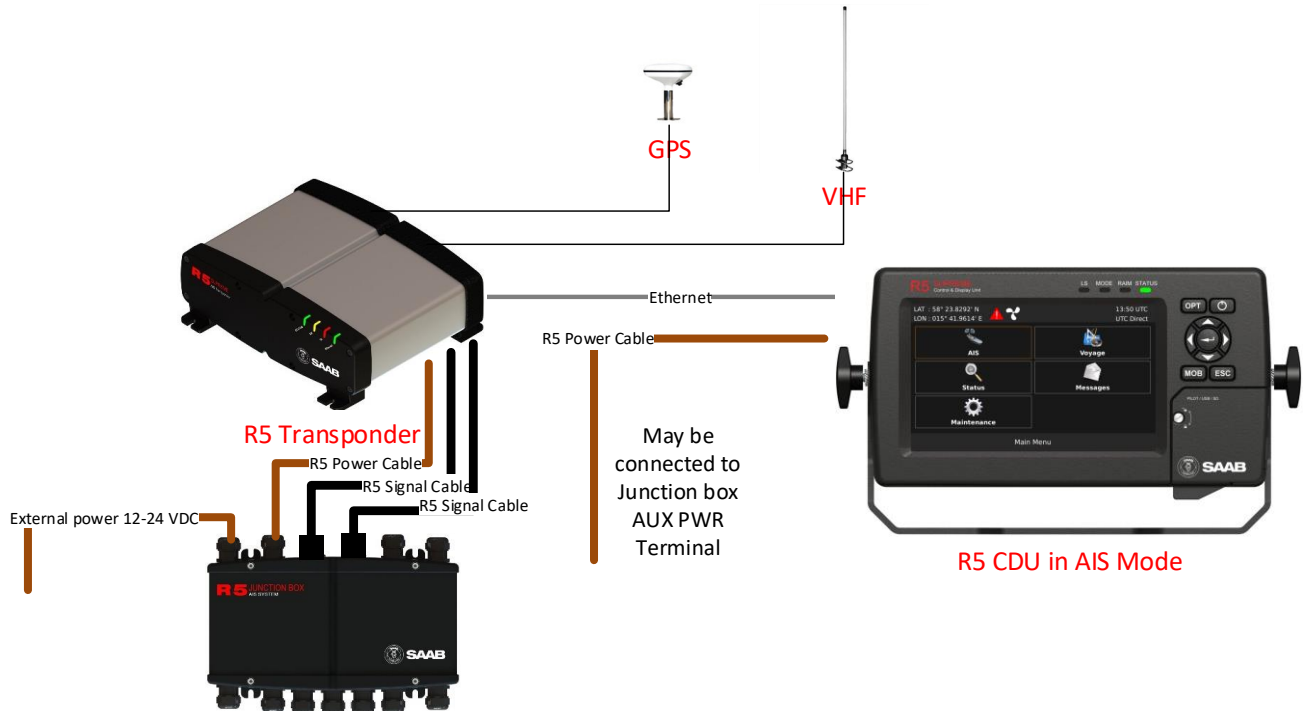


Figure 1- System overview

	R5 Supreme AIS Transponder 7000 118-540	R5 AIS Junction box 7000 118-120
R5 AIS Junction box 7000 118-120	2 x R5 Signal cable DSUB-DSUB 7000 118-286 R5 Power Cable 7000 118-077	-
R5 CDU 7000 118-530	R5 SUPREME Ethernet Cable, 7000 000-525	R5 Power Cable 7000 118-077

Table 3 – AIS System interconnect



4.5 Installation Procedure

When installing the R5 SUPREME AIS System it is recommended to follow the steps described in this installation manual. Details of the installation procedure can be found in the coming sections of the manual.

Recommended installation steps:

1. Mount the R5 SUPREME CDU at conning station
2. Mount the R5 SUPREME transponder
3. Mount the alarm relay unit (if applicable)
4. Connect all external systems and sensors to the R5 AIS Junction Box
5. Mount the R5 AIS Junction box
6. Connect the R5 SUPREME transponder and R5 SUPREME CDU directly or to Ethernet network
7. Mount the VHF antenna
8. Mount the GPS antenna
9. Power up the system
10. Configure IP and SFI settings
11. Set additional configuration parameters
12. Perform system functional check

4.6 Installing the R5 SUPREME CDU

4.6.1 CDU Location

The R5 SUPREME CDU should be mounted close to the position from which the ship is normally operated, preferably on the bridge console close to the conning position.

When mounting the R5 SUPREME CDU, please consider the following:

- The temperature and humidity should be moderate and stable, +15°C to +35°C (Operating temperature: -15°C to +55°C.)
- Select a location away from excessive heat sources
- Avoid areas where there is a high flow of humid salt air
- Avoid places with high levels of vibrations and shocks
- Avoid mounting the R5 SUPREME CDU in direct sunlight. Prolonged exposure to direct sunlight may have adverse effects to the system.
- Ensure that there is enough airflow to avoid high ambient temperatures
- The units can affect magnetic compasses.
 - The minimum compass safe distance from the R5 SUPREME CDU is 0.75 meters to a standard magnetic compass and 0.50 meters to a steering magnetic compass.

4.6.2 R5 SUPREME CDU Mounting Options

The R5 SUPREME transponder and CDU are equipped with power and interface connectors designed to prevent water ingress.



However, the SD, USB and Pilot connectors under the CDU front hatch are protected by the hatch only; the connectors are NOT water proof.

It is therefore recommended to keep the CDU hatch closed when possible. The hatch has a locking mechanism designed to prevent unintentional opening. Depending on installation type it may be desired to keep this hatch locked.

It is recommended to install the system in an environment that is as protected from direct sunlight and water spray as possible. The R5 SUPREME CDU can be mounted in three different ways.

- Gimbal mount
- Panel mount
- Mounting frame panel mount – The CDU can be mounted in a frame that will cover a mounting hole from a previous R4 MKD flush mount installation.

4.6.2.1 CDU Gimbal Mount

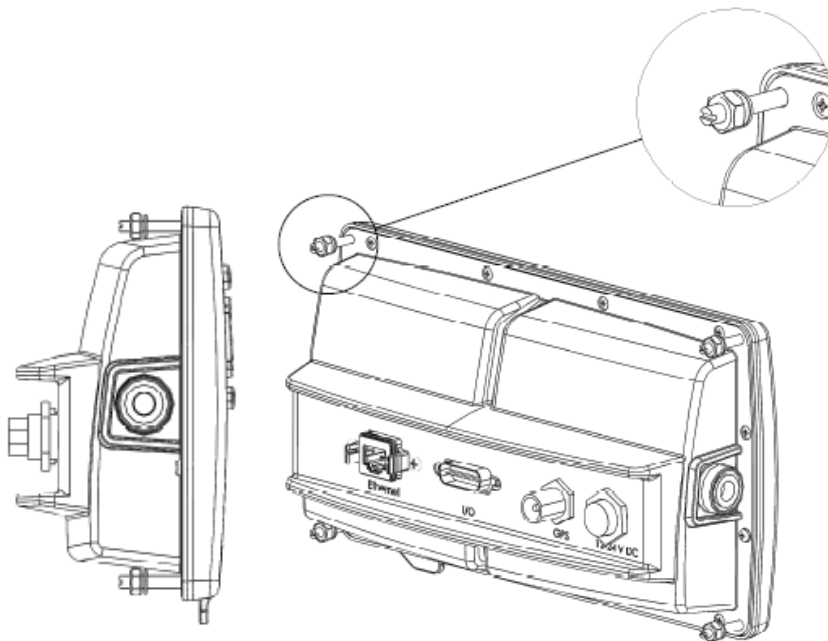
The gimbal mount allows for a quick installation, and is suitable for panel as well as ceiling mounting. It will give the benefit of a tilt-able display and the possibility to mount and dismount CDU easily.

The gimbal mount is fastened with four screws in the mounting surface. The CDU is attached to the gimbal mount with two wing knobs.

4.6.2.2 Panel Mount

Panel mounting will reduce bridge clutter and reduce the space needed for installation. A cutout fitting the CDU profile must be made. See Section 16.4 CDU Cutout Measurements for Panel Mount for dimensions.

The CDU is fastened in place using the bolt and knot from the included mounting kit 7000 118-315.





4.6.2.3 Mounting frame panel mount

The optional mounting frame, “R5 CDU R4 MKD Adapter Frame” P/N: 7000 118-367, is ideal when upgrading from a panel mounted R4 Display, as it will cover the hole left by the R4 Display.

The CDU can be attached to the panel mount frame using the mounting kit 7000 118-315 included with the R5 CDU.

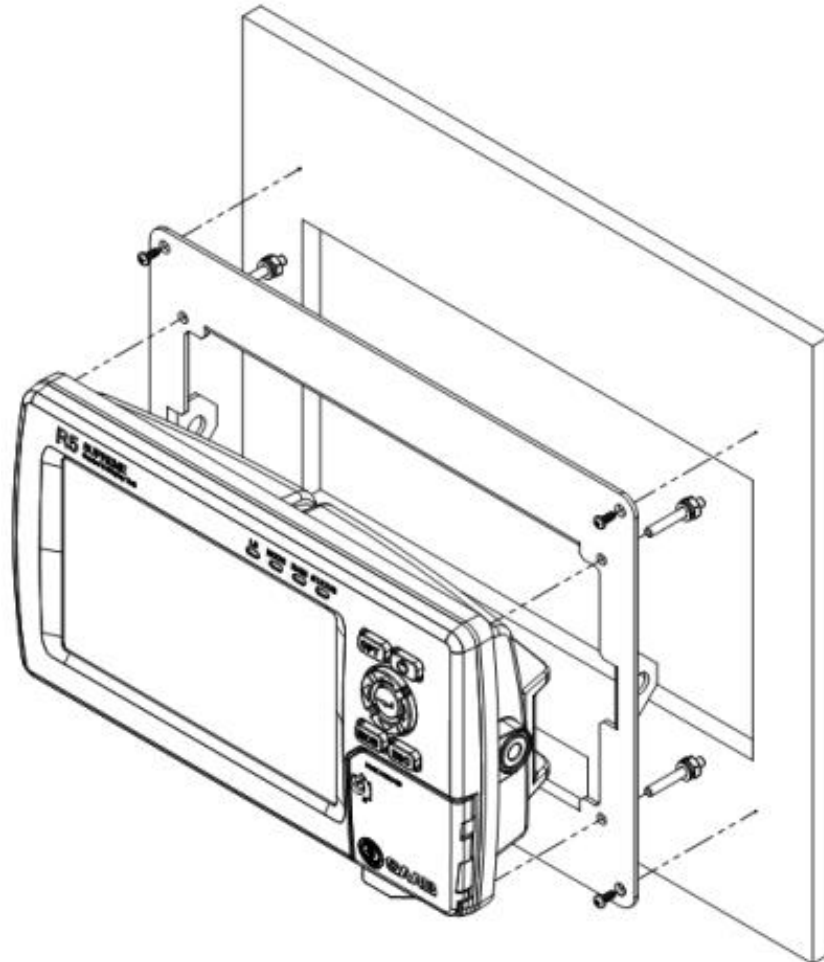


Figure 2 – R5 SUPREME CDU, Mounting frame panel mount

The cutout dimensions may need to be increased somewhat compared to the R4 Display cutout, as the R5 CDU is slightly wider. See Section 16.5 CDU Mounting Frame cutout and dimensions.



4.8 Installing the R5 SUPREME Transponder

4.8.1 Transponder Location

When mounting the R5 SUPREME Transponder, please consider the following:

- Mount the unit on a wall or on top of a bench
- The temperature and humidity should be moderate and stable, +15°C to +35°C (Operating temperature: -15°C to +55°C.)
- Select a location away from excessive heat sources
- Avoid areas where there is a high flow of humid salt air
- Avoid places with high levels of vibrations and shocks
- Ensure that there is enough airflow to avoid high ambient temperatures
- Ensure that the cables can be connected without violating their minimum bending radius
- The unit can affect magnetic compasses. The minimum compass safe distance is 0.65 meters to a standard magnetic compass and 0.40 meters to a steering magnetic compass
- Install the R5 SUPREME transponder as close as possible to the transponder's VHF/GPS antennas to minimise cable loss

4.8.2 R5 SUPREME Transponder Mounting

The Transponder unit is secured in place using the screw holes in the four feet in the bottom corners.

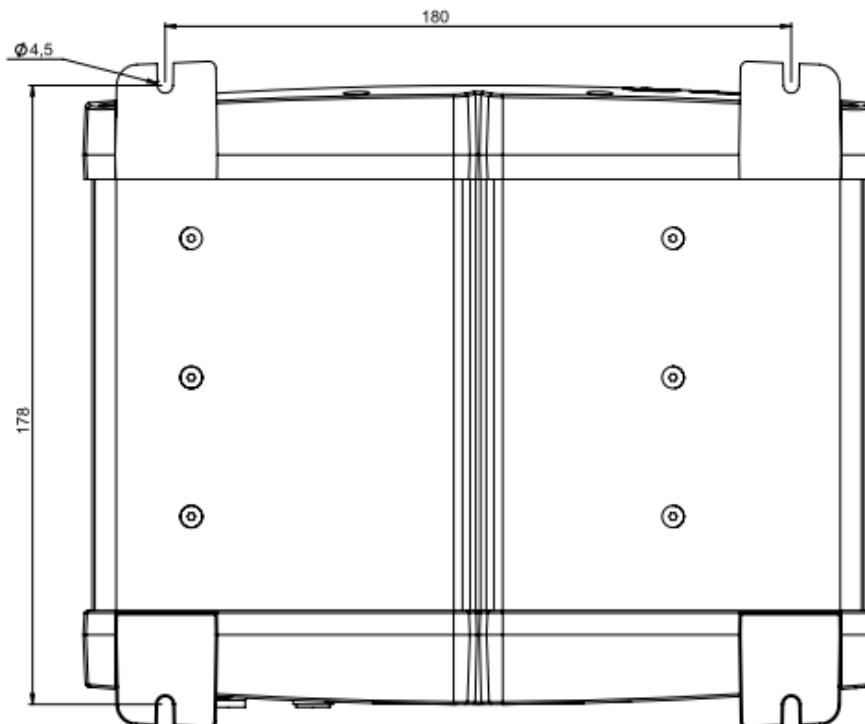


Figure 3 – Transponder mounting holes.



4.9 Install the R5 AIS Junction Box

4.9.1 Junction Box Location

The R5 Signal Cables connecting the transponder to the Junction box are 2m long hence this is the maximum distance between the Junction Box and the Transponder unit.

The R5 AIS Junction Box is made from EMI shielded plastic.

Leave a clearance around the R5 AIS Junction Box to facilitate service and installation. See below figure for minimum recommended clearance area (measurements in mm).

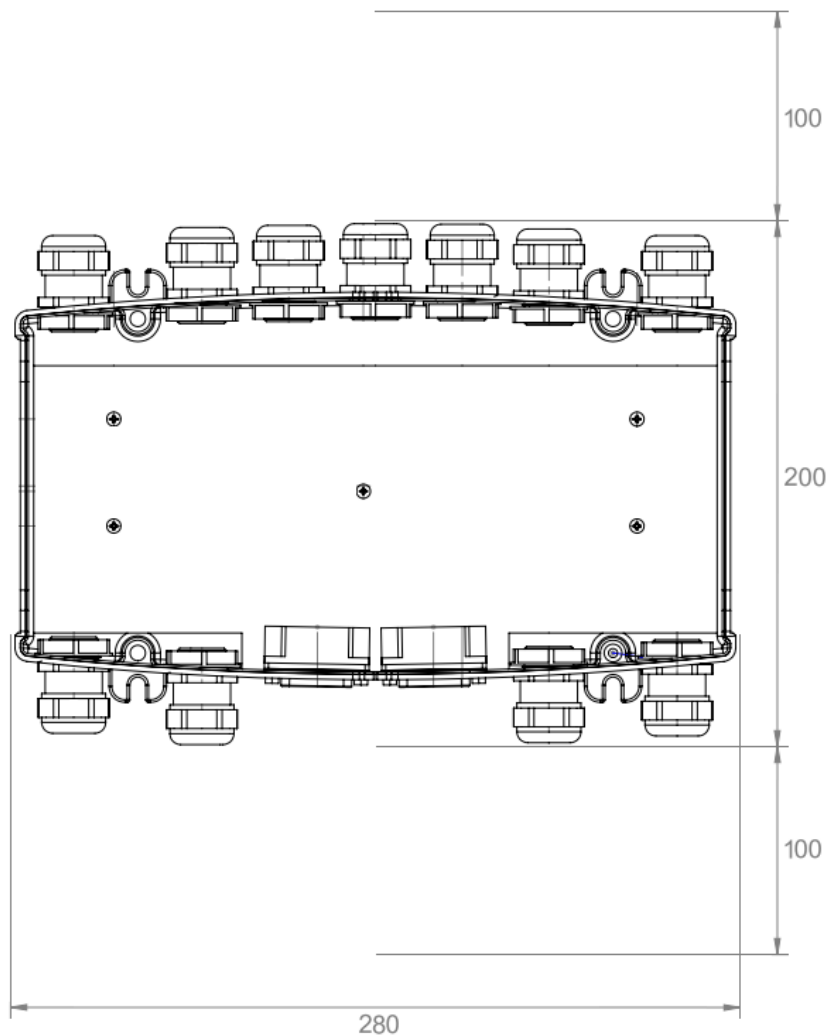


Figure 4 – Recommended Clearance Area (mm) for R5 AIS Junction Box

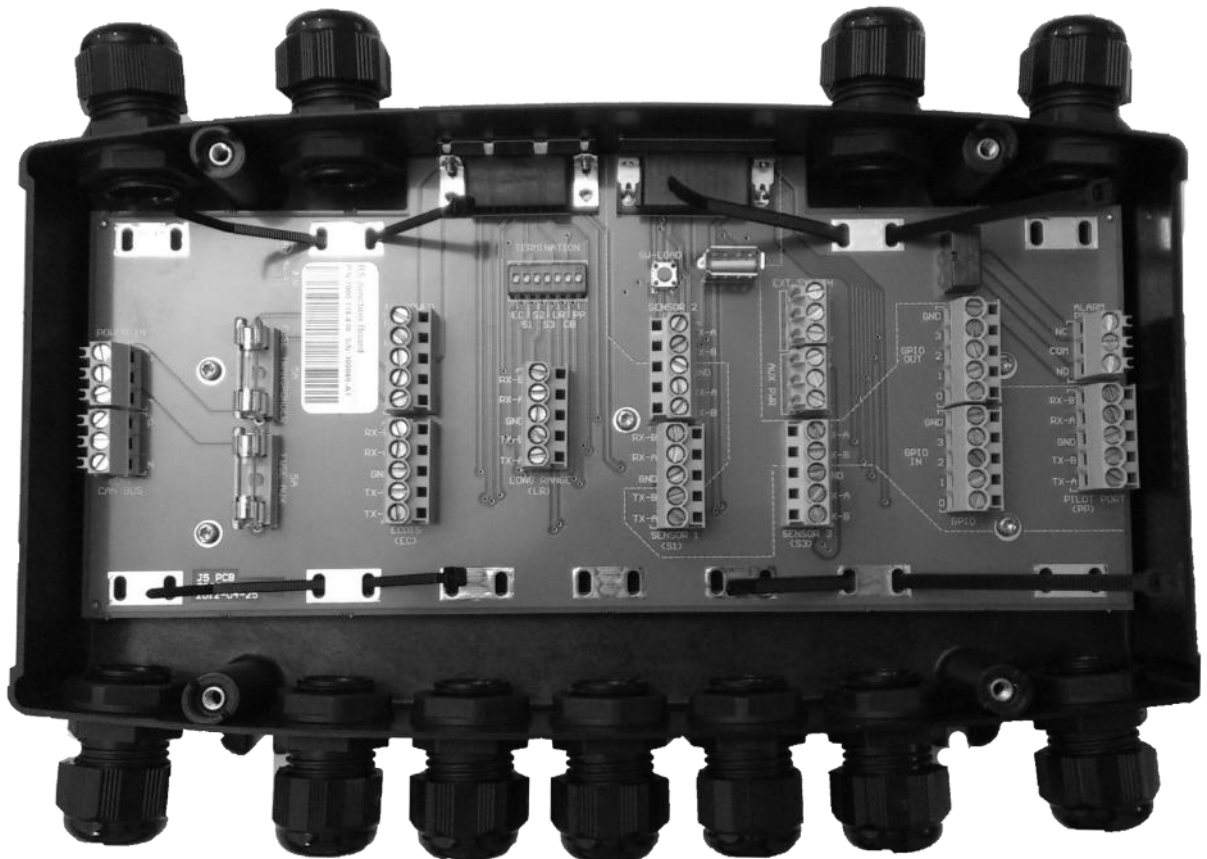


4.9.2 Junction Box Connections

The Junction box feature two 26-pin DSUB connectors, one male and one female.

All other connectors are internal of terminal block type.

Note: The R5 AIS Junction Box has two internal 5A fuses. The first fuse protects the connected transponder and the other one is an auxiliary fuse. The auxiliary fuse is meant to protect any device that is connected to the auxiliary power terminal block. The CDU is an example of such a device.



Interfaces:

Please see Section 15.2 “R5 AIS Junction box Interfaces” for details.

- It is recommended to connect external cables to the Junction box before mounting the box to a surface.
- Open the lid of the R5 AIS Junction Box.
- Fix the box on an appropriate surface/place with using the screw holes on the four feet of the junction box.
- Pull the cables through suitable cable glands. These glands are located on the front and back of the junction box. Please note that the glands can be removed if the cables are too thick. With the glands mounted, the maximum supported cable diameter is 12mm. Without the glands mounted, the maximum supported cable diameter is 19.5mm.
- Shielded cables should be stripped down to the shielding and fastened with cable ties (not included). There are eleven cable tie fastening points on the circuit board, one for every anti-vibration gland on the junction box. Make sure that the cable shielding touches the tin plated area at the fastening point. The maximum supported cable tie width is 4.5mm.



- Tighten the anti-vibration glands so that the cables are secured.
- Connect the cables to the terminal blocks.
- Fix the lid to the box casing.

4.10 Mount the VHF Antenna

The R5 SUPREME Transponder, like any other ship borne transceiver operating in the VHF maritime band, may cause interference to a ship's VHF radiotelephone. Because AIS is a digital system, this interference may occur as a periodic (e.g. every 10 second) soft clicking sound on a ship's radiotelephone. This effect may become more noticeable when the VHF radiotelephone antenna is located close to the AIS VHF antenna and when the radiotelephone is operating on channels near the AIS operating channels (e.g. channels 27, 28 and 86).

Attention should be paid to the location and installation of different antennas in order to obtain the best possible efficiency. Special attention should be paid to the installation of mandatory antennas like the AIS antennas.

Therefore, installing the AIS VHF antenna is also a crucial part of the system installation. How and where you install your AIS VHF antenna and cable will affect its efficiency.

4.10.1 VHF Antenna Location

Location of the mandatory AIS VHF antenna should be carefully considered. Digital communication is more sensitive than analogue/voice communication to interference created by reflections in obstructions like masts and booms. It may be necessary to relocate the VHF radiotelephone antenna to minimize the interference effects. Installing the VHF antenna for AIS on a vessel is a compromise between the following items:

- Antenna type
- Antenna separation
- Clear view of the horizon
- Antenna height

4.10.1.1 Antenna Type

The AIS VHF antenna should have Omni directional vertical polarization providing unity gain.

4.10.1.2 Antenna Separation

AIS transponders use simplex channels at frequencies on the high side of the marine mobile band (AIS channel A = 2087, 161.975 MHz, and AIS channel B = 2088, 162.025 MHz). These channels are close to the duplex channels used for shore to ship marine communication. The AIS VHF antenna should be separated as much as possible from the voice VHF installations used for main communication to avoid unnecessary interference.

There should not be more than one antenna on the same level. The AIS VHF antenna should be mounted directly above or below the ship's primary VHF radiotelephone antenna, with no horizontal separation and with a minimum of 2 meters vertical separation. If it is located on the same level as other antennas, the distance apart should be at least 10 meters.

The AIS VHF antenna should be installed safely away from interfering high-power radiating sources like radar and other transmitting radio antennas, preferably at least 3 meters away from and out of the transmitting beam.



4.10.1.3 Clear View of the Horizon

The AIS VHF antenna should be placed in an elevated position that is as free as possible with a minimum distance of 2 meters in horizontal direction from constructions made of conductive materials. The antenna should not be installed close to any large vertical obstruction. The objective for the AIS VHF antenna is to see the horizon freely through 360 degrees.

4.10.1.4 VHF Antenna Height

The AIS is using VHF radio frequencies, which propagation characteristics are close to line of sight. The higher the antenna location is, the longer the range will be.

4.10.2 VHF Cabling

The cable should be kept as short as possible to minimize attenuation of the signal. Double shielded coaxial cable equal or better than RG214 is recommended to minimize the effects from electromagnetic interference from high power lines, radar or other radio transmitter cables.

The table below gives recommendation on cables that can be used for the VHF-antenna connections. The cable attenuation shall be kept as low as possible; a 3 dB loss is the same as cutting the signal strength in half.

Type	Attenuation @ 150 MHz (dB/100m)	Ø (mm)	Weight (kg/100m)
RG 214	7	10.8	18.5
RG 217	5	13.8	30.1
RG 225	8	10.9	23.3

Table 4 – VHF Antenna Cables

Ex: A cable of 40 meter RG 214 has a cable attenuation of 2.8 dB.

4.10.3 VHF Cable Mounting

Coaxial cables should be installed in separate signal cable channels/tubes and at least 10 cm away from power supply cables. Crossing of cables should be done at right angles (90°).

Coaxial cables should not be exposed to sharp bends, which may lead to a change of the characteristic impedance of the cable. The minimum bending radius should be 5 times the cable's diameter.

All outdoor installed connectors should be weather proofed, e.g. with shrink tubing, watertight seal tape or butyl rubber tape and plastic tape sealing, to protect against water penetration into the antenna cable.

Secure the cable properly close to the cable ends.

4.10.4 VHF Cable Grounding

Coaxial down-leads must be grounded. The coaxial shielding screen should be connected to ground.



4.11 Mount the GPS Antenna

The R5 SUPREME shall be connected to a GPS antenna type MA-700, AT575-68 or a combined AC Marine GPS/VHF antenna. 5V DC is supplied through the antenna lead for the antenna preamplifier.

If the combined AC Marine GPS/VHF antenna is used the diplexer unit shall be installed in an indoors environment.

Attention should be paid to the location and installation of the different antennas on the ship in order to obtain the best possible efficiency. Special attention should be paid to the installation of mandatory antennas like the AIS antennas.

Therefore, installation of the GPS antenna is a crucial part of the system installation. How and where you install your GPS antenna and cable will greatly affect its sensing efficiency.

4.11.1 GPS Antenna Location

The GPS antenna must be installed where it has a clear view of the sky. The objective is to see the horizon freely through 360 degrees with a vertical observation of 5 to 90 degrees above the horizon. Small diameter obstructions, such as masts and booms do not seriously degrade signal reception, but such objects should not eclipse more than a few degrees of any given bearing. Do not mount the antenna in the top of a mast or tower, as this may degrade the COG and SOG readings.

Locate the GPS antenna at least 3 meters away from and out of the transmitting beam of high-power transmitters such as S-Band Radar (typically $\pm 15^\circ$ vertically from the array's centre point) and/or Inmarsat systems (A, B, C, or M; typically $\pm 10^\circ$ from the array's centre point in any of the possible transmitting directions).

Locate the GPS antenna at least 3 meters away from HF or VHF radios or their antennas. This includes the ship's own AIS VHF antenna if it is designed and installed separately.

4.11.2 GPS Cabling

The gain of the GPS antenna built-in pre-amplifier shall match the cable attenuation. The resulting installation gain (pre-amplifier gain minus cable attenuation) shall be within 0 to 26 dB. A minimum value of 10 dB is recommended for optimum performance.

Double shielded coaxial cable is recommended. The coaxial cable should be routed directly between the GPS antenna and the R5 SUPREME Transponder's GPS connector in order to reduce electromagnetic interference effects. The cable should not be installed close to high-power lines, such as radar or radio-transmitter lines or the AIS VHF antenna cable. A separation of 1 meter or more is recommended to avoid interference due to RF-coupling. Crossing of antenna cables should be done at 90 degrees to minimise magnetic field coupling.

The table below gives recommendation on cables that can be used for the Transponder GPS-antenna connections. Due to the high frequency it's important that the attenuation in the cable is low for the specific frequency (1.5 GHz).



Type	Attenuation @ 1.5 GHz (dB/m)	Ø (mm)	Weight (kg/100m)
RG 58	0.9	5	3.7
RG 400	0.6	4.95	6.3
RG 223	0.6	5.40	5.5
RG 214	0.35	10.8	18.5
RG 225	0.3	10.9	23.3

Table 5 – GPS Antenna Cables

For optimum performance approximately +10dB gain should be available when the cable attenuation has been subtracted from the GPS-antenna preamplifier gain. The net gain shall not exceed +26dB.

Example:

Cable type	Preamplifier gain (dB)	Required min. cable length (m)	Recommended max. cable length (m)
RG 58	12	0	2
RG 58	26	0	18
RG 58	30	4.5	22
RG 223	12	0	3.5
RG 223	26	0	26.5
RG 223	30	6.5	33.5
RG 214	12	0	6
RG 214	26	0	46
RG 214	30	11.5	57

Table 6 – GPS Antenna Cable Examples

Min length = (Preamp. Gain – 26 dB)/Cable attenuation per meter

Max length = (Preamp. Gain – 10 dB)/Cable attenuation per meter

4.11.3 GPS Cable Mounting

Coaxial cables should be installed in separate signal cable channels/tubes and at least 10 cm away from power supply cables. Crossing of cables should be done at right angles (90°).



Coaxial cables should not be exposed to sharp bends, which may lead to a change of the characteristic impedance of the cable. The minimum bending radius should be 5 times the cable's diameter.

All outdoor installed connectors should be weather proofed, e.g. with shrink tubing, watertight seal tape or butyl rubber tape and plastic tape sealing, to protect against water penetration into the antenna cable.

Secure the cable properly near the cable ends.

4.11.4 GPS Cable Grounding

Coaxial down-leads must be used. The coaxial shielding screen should be connected to ground.

4.12 Electrical Installation details

For complete specification of signal interface details see Section 15 "Electrical Interfaces"

4.12.1 Input port priority

The protocol of the serial port interfaces is compliant to IEC 61162-1Ed.4 (2010-11).

All serial ports in the R5 SUPREME Transponder have the same capabilities with one exception, any Long Range equipment must be connected to the Long Range port. Apart from that, all ports are bidirectional ports and can be connected to any external equipment such as ECDIS and external sensors. The primary external position sensor should be connected to the Sensor 1 port since this port has the highest priority. The serial ports in the R5 SUPREME Transponder can also receive differential corrections in RTCM format for the internal GPS receiver. The ports in the R5 SUPREME Transponder have different default baud rates but they can all be configured to any baud rate of 4800, 9600, 38400, 57600 or 115200 bps. The priority levels for input of sensor data on the different ports are listed below:

Priority	Identification	Default Baud Rate
1 (Highest priority)	Sensor 1	4800 bps
2	Sensor 2	4800 bps
3	Sensor 3	4800 bps
4	ECDIS	38400 bps
5	Long Range	9600 bps
6	Transponder Pilot	38400 bps
7 (Lowest priority)	CDU Pilot	38400 bps

Table 7 – Port Priorities and Default Baud Rates

If valid position data from external position sources are input on both Sensor 1 and ECDIS port, the position data from Sensor 1 will be used.

If the same data is provided using different NMEA sentences on the same port, the priority depends on the sentence in accordance with Table 8.



Priority	Position	COG/SOG	HDG	ROT
1 (Highest)	RMC	RMC	THS	ROT
2	GNS	VTG	HDT	-
3	GGA	VBW	OSD	-
4	GLL	OSD	-	-

Table 8 – Sentence priority

4.12.2 Output Drive Capacity for Serial Ports

Each serial port transmitter can have a maximum of 25 listeners drawing 2.0 mA each.

4.12.3 Input Load

Input impedance for each listener input is 6.4 kΩ.

4.12.4 Schematics of Serial Transceivers

Each of the RS422 serial interfaces fulfils the requirements of IEC 61162-2 and IEC 61993-2. A detailed schematic of one of the serial ports is shown below.

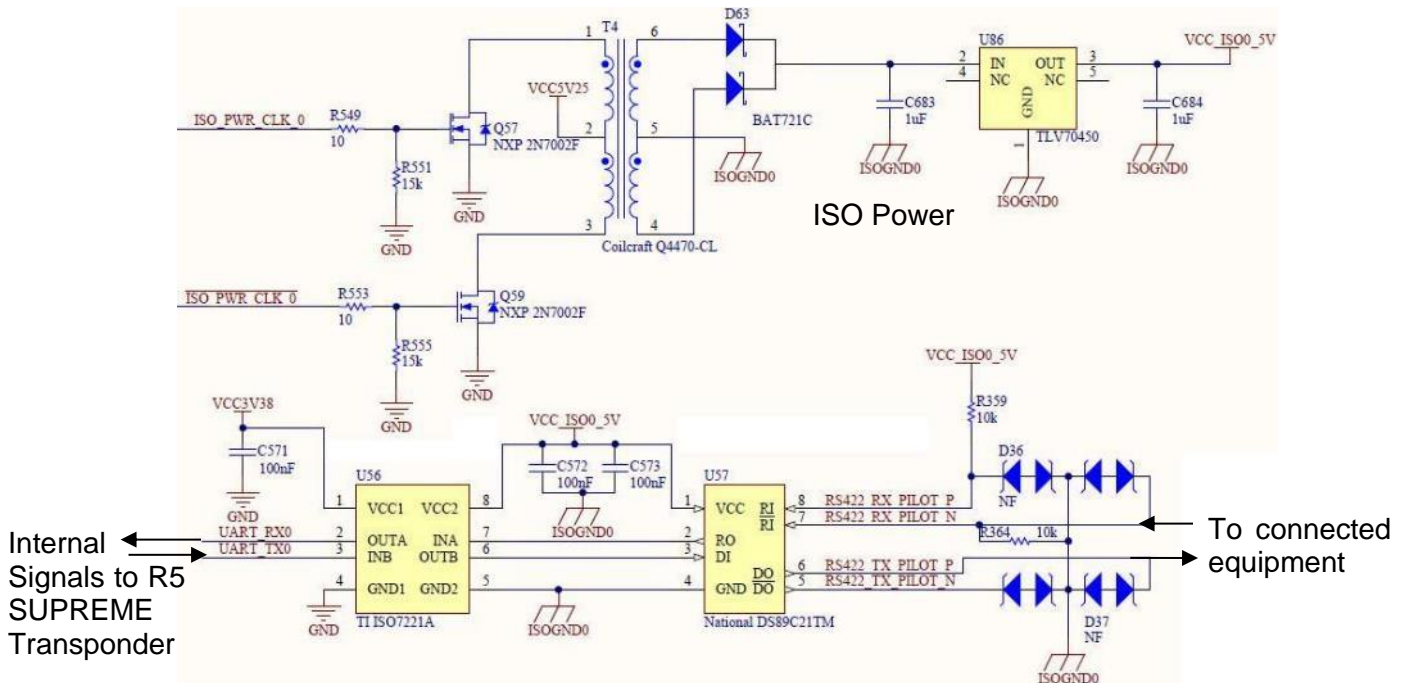


Figure 5 – Serial Port Schematics



4.12.5 Discrete Input/Output Signals (GPIO)

The R5 SUPREME Transponder has four discrete input signals and four discrete output signals which are used in e.g. R5 SUPREME W-AIS installations. These GPIO signals have the following capacities:

High-level input voltage (will be interpreted as logical "1" if above)	2.1 V
Low-level input voltage (will be interpreted as logical "0" if below)	0.9 V
High-level output voltage (shall be interpreted as logical "1")	Min 2.48 V Max 3.38 V
Low-level output voltage (shall be interpreted as logical "0")	Max 0.5 V
Maximum Output Current	4 mA

4.12.5.1 Discrete Alert Acknowledgement

The R5 SUPREME Transponder has support for a discrete alert acknowledgement signal that will acknowledge all currently active alerts when it is activated.

The signal must be configured for alert acknowledgement operation, which is done with the parameter "AIS Alert ACK Binary Port" listed in chapter 0. It can be configured for activation on either rising edge or falling edge.

The alert acknowledgement input shall be connected to GPIO IN 1. It has an internal pull down resistor so by connecting it to a switch with an appropriate voltage on the other side the rising and falling edges can be generated.

A suitable voltage (3.3V) is available on GPIO OUT 1 when configured for alert acknowledgement operation.

Recommended installation

Connect a switch between GPIO OUT 1 and GPIO IN 1. When the switch is closed a rising edge will be generated and when the switch is opened a falling edge will be generated.

4.12.6 Transponder Connections

- Connect Ethernet cable to network or directly to R5 SUPREME CDU Ethernet port.
- Connect R5 Power Cable to R5 AIS Junction box.
- Connect CDU and Transponder Ground terminals to ship ground.
- Connect one R5 Signal Cable to Transponder **RS422** port and R5 AIS Junction box.
- Connect one R5 Signal Cable in opposite direction to Transponder **I/O** port and R5 AIS Junction box.
- Connect GPS antenna to GPS port and VHF antenna to VHF port



Note: The I/O port gender is opposite from the RS422 port, and the R5 Signal cable is Male to Female. This will ensure that the wrong transponder port is not connected to the wrong junction box DSUB port.

4.12.7 CDU Electrical Connections

- Connect Ethernet cable to network or directly to R5 SUPREME Transponder Ethernet port.
- Connect R5 Power Cable to Junction box or other External power with 5A Fuse.
- Connect Ground terminal to ship ground.

4.12.8 R5 AIS Junction box connections

Figure 1 show a general overview how the R5 SUPREME AIS System can be connected to the R5 AIS Junction Box. For a more detailed description of the cable connections, see section 4.3 Installation Cables.

4.12.8.1 R5 System general connections

- Connect External power to the POWER IN.
- Connect R5 Power cable from R5 Transponder to R5 POWER terminal
- Connect R5 Power cable from R5 CDU to AUX PWR terminal (optional)

Note: R5 CDU can be mounted in a remote location and use another power source.

- Connect R5 Signal Cables from R5 Transponder I/O and RS422 ports to Junction box DSUB connectors.

Note: Both the R5 SUPREME Transponder's 26-pin interface ports (marked RS-422 and I/O) should be connected to the R5 AIS Junction Box by using two R5 Signal Cables, DSUB-DSUB.

4.12.8.2 External connections

- Connect external sensor providing GPS Position (mandatory)
- Connect external sensor providing True Heading, and Rate of Turn if available.
- Connect: DGPS Beacon receiver providing RTCM-104 format data to any of the RS-422 input screw terminals



4.12.9 External Switch

It is possible to connect an external switch to the R5 SUPREME Transponder.

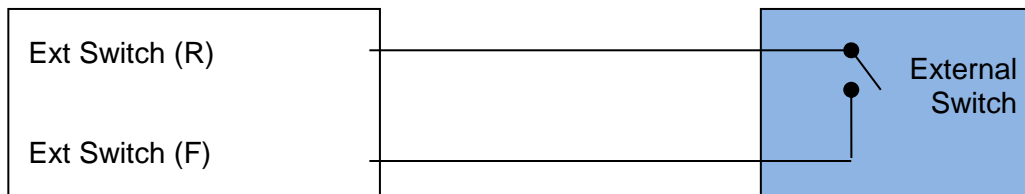
The switch may be used to quickly turn off transmissions (TX OFF), or it may also be used to force the radio transmit power to 1W only.

Note: Manually set 1W mode operation, or Silent Mode, is outside of type approved operational mode.

To use the External Switch functions, it must be configured accordingly in Misc. Interface view accessed from *Main Menu → Maintenance → Configuration → Interface → Misc. Interfaces.*

The status of the switch can be controlled by input on the brown and orange wires of the R5 Power Cable (See section 4.3 for cable details), or by connecting to the R5 AIS Junction Box (R) and (F) signals in the Ext Switch terminal block.

Connect the external switch as in the figure below. When the switch is open, all VHF transmissions will be disabled or only transmit in low power mode depending on configuration. When the switch is closed, the R5 SUPREME Transponder will transmit normally or transmit at normal power level.



4.12.10 Alarm Relay

It is required that the AIS alert output (relay) is connected to an audible alert device or the ship's alert system, if available. The R5 AIS Junction Box has a built in alert relay that can be connected to the ship's alert system. If the installation is done without the junction box, an external alarm relay should be connected.

Alternatively, the ship's alert system may use the alert messages output on the AIS Presentation Interface (PI) provided the alert system is AIS compatible. The AIS Alarm Relay is either mounted on a DIN mounting rail or direct on the wall.

The alarm relay wires have the following colour codes in the 26-pole R5 signal cable:

RELAY VCC	Brown / Red
RELAY GND	White / Pink
RELAY OUT	Pink / Brown

Table 9 – Alarm Relay Wires

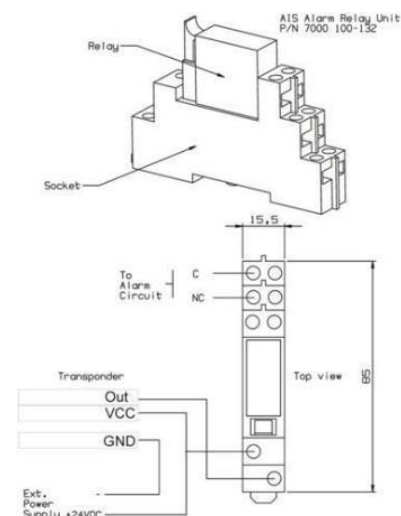


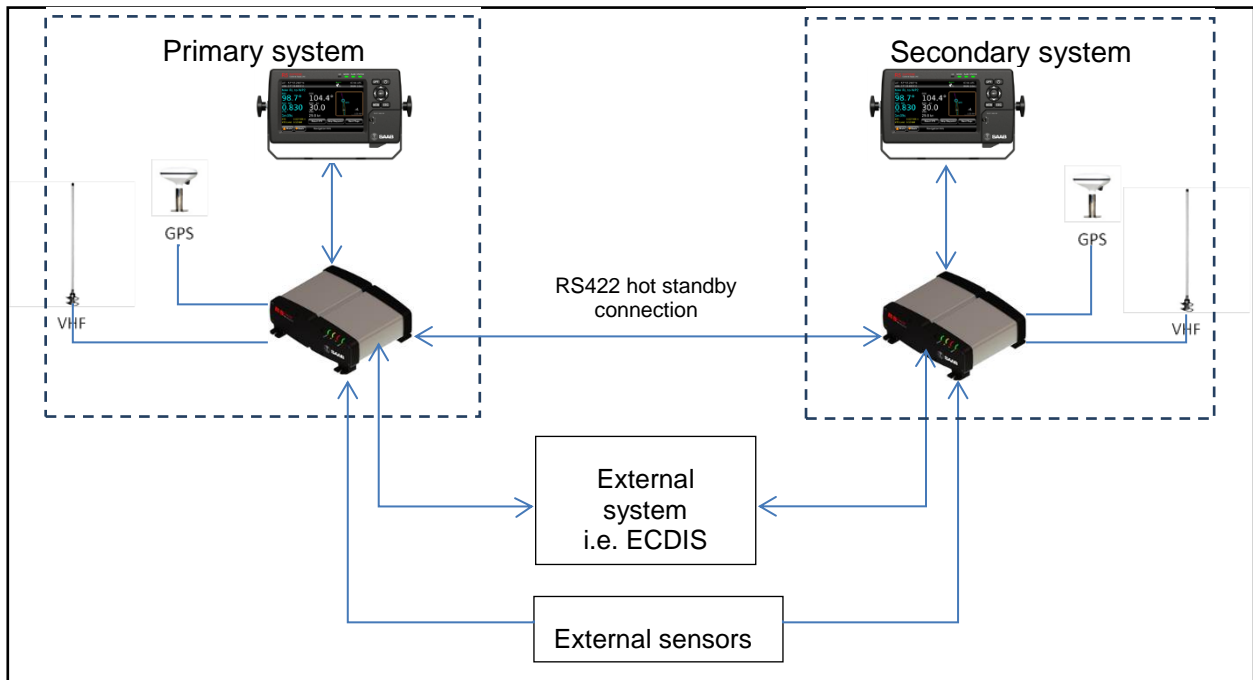
Figure 6 – Alarm Relay



4.13 Hot Standby Installation

The R5 SUPREME AIS Transponder system can be installed in a “Hot Standby” configuration where two complete R5 SUPREME AIS systems are used to get full redundancy. Each transponder system has its own R5 SUPREME CDU, R5 SUPREME AIS Transponder, GPS antenna and VHF antenna.

The only interconnection required between the two systems in the hot standby pair is a RS422 serial cable between the two R5 SUPREME AIS transponders.



One transponder will be in standby mode and be silent while the other transponder is active and operates as a normal transponder. If the active transponder stops working the standby transponder will wake up and take over the transmissions.

Since the systems shall be able to function as normal stand-alone systems, all external sensors need to be connected to both systems independently. With RS422 this is easily done since sensor data is one-way and both transponders can be connected to each sensor in a multiple listener fashion.

For external systems requiring redundant AIS operation each such system must be connected to both the primary and secondary systems.



The systems will monitor each other and the system with the best current status will be used as the active system while the other is in standby mode. If both transponder systems have exactly the same status, the system configured as "Primary" will be chosen as the active system. Important criteria will be considered when selecting the transponder with the best status. These criteria are listed below in decreasing severity:

1. "General Fault" alert
2. "Transceiver fail" alert
3. "Impaired Radio" alert
4. "Sync In Fallback" alert
5. "Lost Position" alert
6. "Missing SOG" alert
7. "Missing COG" alert
8. "Missing Heading" alert
9. "Missing ROT" alert
10. Position Quality
11. Heading Quality
12. Rate of Turn Quality
13. "Doubtful Heading" alert
14. "Lost MKD" alert
15. Primary/Secondary Configuration

4.13.1 Configure use of Hot Standby functionality

Both units in the hot-standby pair need to be configured for hot-standby operation. There are only two configurations needed for this:

- **Hot Standby Function:** *Disabled, Primary, Secondary*
- **Hot Standby Port:** *ECIDS, Long Range, Pilot (transponder), Sensor 1, Sensor 2, Sensor 3*

In the Hot Standby pair one unit must be configured as "*Primary*" and the other as "*Secondary*", also the baud rate of the Hot Standby port on the two units needs to match.

Hot Standby Function and Hot Standby Port parameters can be configured from the *Misc Interface Configuration* view described in section 0. The baud rate of the selected Hot Standby port can be configured in the *Port Rates* view described in section 5.3.16.



4.13.2 Hot Standby Synchronizing

The transponders in the Hot Standby pair will continuously synchronize static and voyage data so that the same information is sent out on the VHF link regardless of which transponder is active. The transponder configured as “Secondary” will during the pairing procedure adapt its sync parameters according to the transponder set as “Primary”. The following parameters are synchronized in Hot Standby mode:

- MMSI (Maritime Mobile Service Identity)
- IMO number (International Maritime Organization)
- Call Sign
- Ship Name
- Ship Type
- Height over Keel
- Persons on Board
- Draught
- Destination
- ETA (Estimated Time of Arrival)
- Navigation Status
- Operational Mode

4.13.3 Hot Standby Status Icons

The current Hot Standby status is indicated with an icon in the status bar of the R5 SUPREME CDU. The following Hot Standby icons can be shown:



Communication issues between transponder units.



Operating as the active (transmitting) transponder in the hot standby pair.



Operating as the standby (silent) transponder in the hot standby pair.

More information about the current Hot Standby operation is also shown in the *Hot Standby Status* view described in section 6.27.



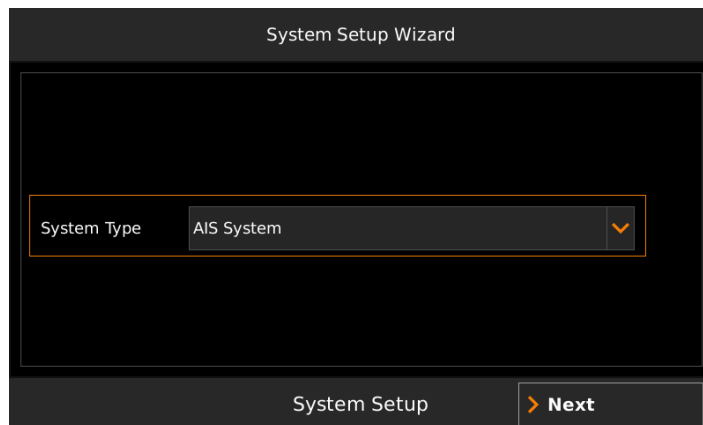
5 CONFIGURATION

When the physical and electrical installation of the system is complete, the R5 SUPREME AIS System needs to be configured. This chapter describes what the installer is required to do before the R5 SUPREME AIS System is fully functional.

5.1 Configuration Wizard

The first time the R5 SUPREME CDU is started, a configuration wizard will be shown. This wizard is a helpful guide to configure the basic functionality of the R5 SUPREME System. The following sections describe the different steps in the configuration wizard.

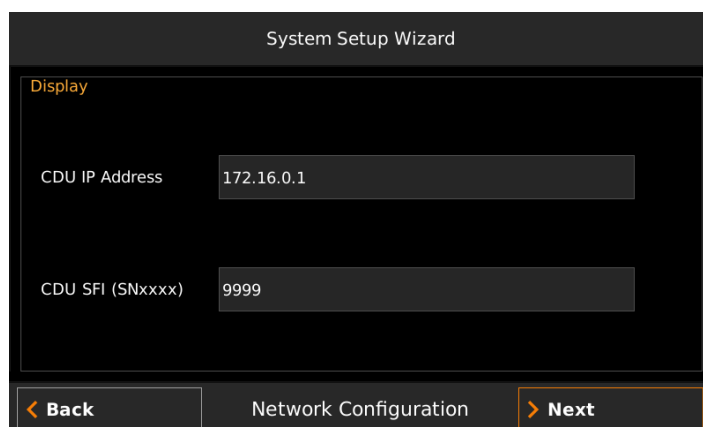
5.1.1 System Setup



The R5 SUPREME CDU can be used in a standalone AIS system, standalone Navigation system, Combined AIS and Navigation system or be used as a slave display to an existing R5 Navigation System. The Navigation system can also be in two different configurations with either an R4/R5 GNSS sensor or an R4/R5 DGNSS sensor. It is up to the user to specify which equipment is connected to the R5 SUPREME CDU.

In a standard AIS installation, the alternative “AIS System” should be selected.

5.1.2 Network Configuration



The R5 SUPREME CDU uses UDP Multicast as defined by IEC 61162-450, to communicate with the R5 SUPREME Transponder as well as other R5 SUPREME CDU units. It is therefore necessary to configure an IP number and a System Function ID (SFI) for the R5 SUPREME CDU. The SFI consists of two letters (always “SN” for the R5 SUPREME CDU) and four digits.



The IP and SFI must be unique for all equipment connected to the same IEC 61162-450 network. The system will require that the default SFI “SN9999” is reconfigured, due to consideration that “System Function Identity” is improper during normal operation.

5.1.3 Select Transponder

When the R5 SUPREME CDU is configured to be used in an AIS system, an R5 Transponder must be located and selected on the network. Make sure that the R5 Transponder has power and is connected to the same network as the R5 SUPREME CDU. In the “Select Transponder” view on the R5 SUPREME CDU, press the button “Refresh List” to search for R5 Transponders on the network. Select the R5 Transponder that the R5 SUPREME CDU should communicate with and press “Next” to go to the Transponder Network Configuration view.

The screenshot shows the 'System Setup Wizard' interface. At the top, it says 'System Setup Wizard'. Below that is a table with three columns: SFI, Serial Number, and Software Version. The first row shows AI9001, 900037, and R5 1.2.3. The second row shows AI1025, 200001, and R5 1.2.4. Below the table is a 'Refresh List' button. At the bottom, there are three buttons: '< Back', 'Select Transponder', and '> Next'.

SFI	Serial Number	Software Version
AI9001	900037	R5 1.2.3
AI1025	200001	R5 1.2.4

5.1.4 Transponder Network Configuration

The screenshot shows the 'System Setup Wizard' interface. At the top, it says 'System Setup Wizard'. Below that is a section titled 'Network ID' with a text input field for 'SFI (AIxxxx)' containing '9001'. Below that is a section titled 'IP Setting' with a text input field for 'IP Address' containing '172.16.0.237'. At the bottom, there are three buttons: '< Back', 'Configure Transponder Network', and '> Next'.

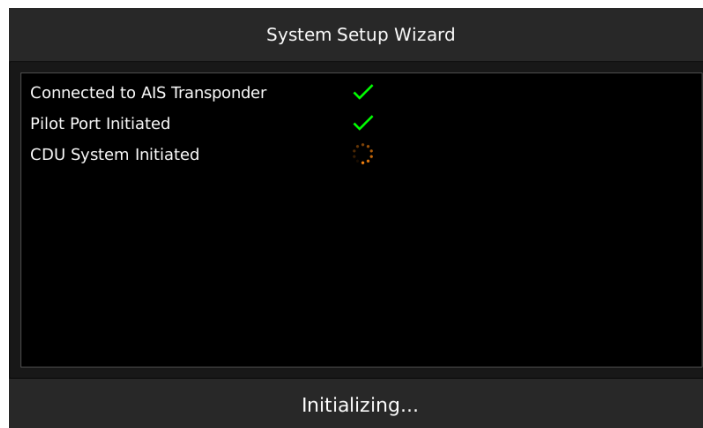
When a transponder has been selected by the R5 SUPREME CDU it is possible to configure the transponder IP address and SFI. The R5 SUPREME Transponder must have a unique SFI that consists of two letters (always “AI” for an R5 Transponder) and four digits. Press “Next” to save changes and finish the configuration wizard.

The R5 Transponder IP address and SFI configuration is password protected. The default AIS user password is “user” and the password is case sensitive.

The IP and SFI must be unique for all equipment connected to the same IEC 61162-450 network. The system will require that the default SFI is reconfigured, due to consideration that “System Function Identity” is improper during normal operation.



5.1.5 Connection Screen



This screen is shown while the R5 SUPREME CDU connects to external equipment and initializes the system. When the initialization is complete the R5 SUPREME CDU will automatically switch to the Target List view when configured as an AIS system.

5.2 System Functional Check

When the R5 SUPREME has been installed according to the procedures described in previous chapters, it is recommended to make a first functional check of the system. Check the following things to ensure that the R5 SUPREME AIS System is fully functional:

- Check the Own Ship Data view to make sure that the configured data is sent on the VHF link, refer to chapter 6.11 “View Transmitted Own Ship Information” for more information.
- Make sure that there are no unexpected active alerts in the alert list, see chapter 6.18 “Alert List”.
- Perform a communication test to ensure that the R5 SUPREME transponder can send and receive messages from other AIS transponders. Refer to chapter 6.28 “Communication Test” for information on how to perform a communication test.

5.3 Configuration Parameters

This section describes the different configuration parameters that can be set in the R5 SUPREME AIS System.

5.3.1 AIS Voyage

This view is accessed by pressing **Main → Voyage → AIS Voyage**.



The parameters in AIS Voyage view are used for input of voyage specific information that is sent over the AIS link. These parameters should typically be configured before each voyage.

Parameter Name	Description
Navigational Status	Changes the navigational status reported by own ship. It is also possible to quickly change navigational status by pressing Nav. Status Icon in the status bar.
Estimated Time of Arrival (ETA)	The estimated time of arrival to destination of current voyage
Destination	The destination for the current voyage
Draught	The vertical distance measured from the lowest point of a ship's hull to the water surface, in meters (one decimal precision)
Hazardous Cargo (X,Y,Z,OS) (not available for all ship types)	Classification of current cargo according to X,Y,Z,OS
Persons on Board	Total number of persons on board

5.3.2 Ship Static

This view is accessed by pressing **Main → Maintenance → Configuration → AIS → Ship Static**

Parameter Name	Description
MMSI	Maritime Mobile Service Identity reported by own ship
IMO	International Maritime Organization number reported by own ship
Ship Name	Ship name reported by own ship
Call Sign	Call sign reported by own ship
Height over Keel	Height over keel in meters (one decimal precision). Height over Keel information is sent as a response to an "Extended Ship Static and Voyage Related Data" request message.
Ship Type (IMO)	Type of Ship according to ITU 1371-5. Both numerical input and selection from list is possible.

5.3.3 Ship Dimensions

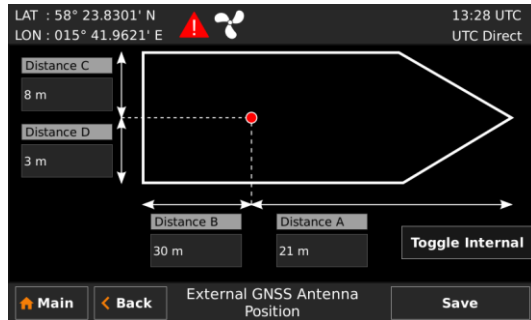
This view is accessed by pressing **Main → Maintenance → Configuration → AIS → Ship Dimensions**



Note: A notification will be created and shown in the alert list if ship dimensions not have been defined.

The parameters in the Ship Dimensions view depends on the configuration parameter “Ship Size Mode” in the Misc. Interfaces view. The Ship Size Mode parameter can be set to either Standard or Simplified (default). The Ship Size Mode affects how the user should input ship size and antenna position information and how it is interpreted.

Standard Mode

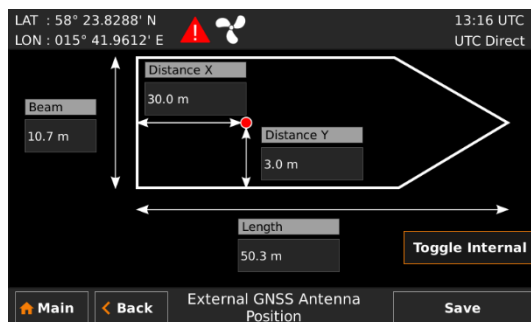


In this mode the user must input:

- *A, B, C, D* for internal antenna [m]
- *A, B, C, D* for external antenna [m]

Simplified Mode (default)

In this mode there is no way for the user to input mismatching data, all parameters uses the same precision and each measurement is entered only once (in standard mode it is for example possible to enter three different length of ship: *Convoy/ship length, internal A+B* and *external A+B*). In simplified mode the transponder will automatically calculate and correctly round the *A, B, C* and *D* values reported on the VHF link.



In this mode the user inputs:

- *Ship length* [m] (one decimal precision)
- *Ship beam* [m] (one decimal precision)
- *X, Y* for internal antenna relative to ship [m] (one decimal precision)
- *X, Y* for external antenna relative to ship [m] (one decimal precision)

Ship dimensions can be temporarily extended during towing operations as described in section 6.13



5.3.4 Regional Areas

This view is accessed by pressing **Main → Maintenance → Configuration → AIS → VHF Radio → Regional Areas**

The view shows the regional areas set in the transponder. These are normally transmitted by an AIS base station to change AIS VHF nominal power level and/or frequencies in a specific area. When editing an area or creating a new area the following parameters can be configured:

Parameter Name	Description
Channel A	The channel number for AIS channel A (2087 = default) that should be used in the regional area
Channel B	The channel number for AIS channel B (2088 = default) that should be used in the regional area
Zone Size	The transitional zone size of the regional area in nautical miles (NM)
Tx Mode	Decides on which channels the transponder will use when transmitting in the regional area. When set to "Silent", the transponder will stop automatic transmissions on AIS channels A and B.
Power	Output power for the transponder in the regional area. High = 12.5 W, Low = 1 W.
LAT NE	The latitude for the North East corner of the regional area
LON NE	The longitude for the North East corner of the regional area
LAT SW	The latitude for the South West corner of the regional area
LON SW	The longitude for the South West corner of the regional area

5.3.5 Long Range Broadcast Configuration

This view is accessed by pressing **Main → Maintenance → Configuration → AIS → VHF Radio → Long Range Broadcast**

Long range messages (Message 27) are position messages designed to aid Satellite reception of AIS position messages. AIS Satellites have a huge antenna footprint, and can have problems with receiving too many targets at the same time. Therefore Message 27 is a slightly shortened position messages, transmitted less frequently than normal position messages, and on frequencies different from normal AIS VHF data.



Parameter Name	Description
LR Broadcast Ch. 1	The first channel number for broadcasting long range message 27. The message is sent every 6 minutes on each channel so if both channels are configured a message 27 will be broadcast every 3 minutes. If this parameter is set to zero no long range broadcast transmissions will be sent on this channel.
LR Broadcast Ch. 2	The second channel number for broadcasting long range message 27. The message is sent every 6 minutes on each channel so if both channels are configured a message 27 will be broadcast every 3 minutes. If this parameter is set to zero no long range broadcast transmissions will be sent on this channel.

5.3.6 Long Range (Reply Mode and Filter Settings)

This view is accessed by pressing **Main → Maintenance → Configuration → AIS → Long Range**

Parameter Name	Description
Reply Mode	<p>When set to “Automatic” the R5 SUPREME Transponder will automatically respond to any Long Range interrogation messages.</p> <p>When set to “Manual” the operator is responsible for sending a response or refusal to any Long Range interrogation message. This can be done from the <i>Long Range</i> view that is accessed from Main Menu → Messages → Long Range. For more information see section 6.16 Long Range Interrogations.</p> <p>The information that is sent in a response is automatically filled in by the R5 SUPREME Transponder depending on the Long Range filter settings (the parameters below).</p>
Ship ID (A)	Filter setting that defines if a Long Range response message should include ship name, call sign and IMO number.
Message Date/Time (B)	Filter setting that defines if a Long Range response message should include information about date and time of message composition.
Latitude / Longitude (C)	Filter setting that defines if a Long Range response message should include position.
Course Over Ground (E)	Filter setting that defines if a Long Range response message should include COG.



Speed Over Ground (F)	Filter setting that defines if a Long Range response message should include SOG.
Destination And ETA (I)	Filter setting that defines if a Long Range response message should include destination and ETA.
Draught (O)	Filter setting that defines if a Long Range response message should include draught.
Ship Type And Cargo (P)	Filter setting that defines if a Long Range response message should include ship type and cargo information.
Ship Size And Type (U)	Filter setting that defines if a Long Range response message should include ship's length, beam and type.
Persons On Board (W)	Filter setting that defines if a Long Range response message should include number of persons on board.

5.3.7 Password

This view is accessed by pressing **Main → Maintenance → Configuration → AIS → Password**

Parameter Name	Description
New User Password	Changes the user level password for the R5 SUPREME AIS System. The default user level password is "user"
New Admin Password	Changes the admin level password for the R5 SUPREME AIS System. The default admin level password is "admin"
Restore Password Key	It is possible to restore both user password and admin password to the default values above with a secret restore key. To obtain the restore key, contact TransponderTech Support and be prepared to provide the serial number of the R5 SURPEME AIS transponder unit.

5.3.8 Display Parameters

This view is accessed by pressing **Main → Maintenance → Configuration → AIS → Display Parameters**

Parameter Name	Description
Require Text Msg ACK	This parameter determines if an ACK msg is required as a response when sending addressed binary text messages to another target.



5.3.9 Visual Settings

Press the OPT button for 5 seconds to reset the visual settings to default values.

To quickly turn off all backlight on the R5 SUPREME CDU, press once on the **PWR** button on the front of the CDU. This will completely turn off all backlight for the LCD; LED's and buttons on the R5 SUPREME CDU. However, if there is an active, unacknowledged alert in the system, the STATUS LED will still be visible and blink with a red light. To return to previous light settings, press the **PWR** button again.

It is also possible to quickly change between day/night modes by pressing and holding down the **PWR** button for 2 seconds. This will enable the **PWR** button options menu, press "Night Mode" or "Day Mode" button to switch mode.

The master display level can be quickly set by selecting the "Dim Backlight" option, where the level is set by moving the slider control. Press "Save" button to store setting and close menu.

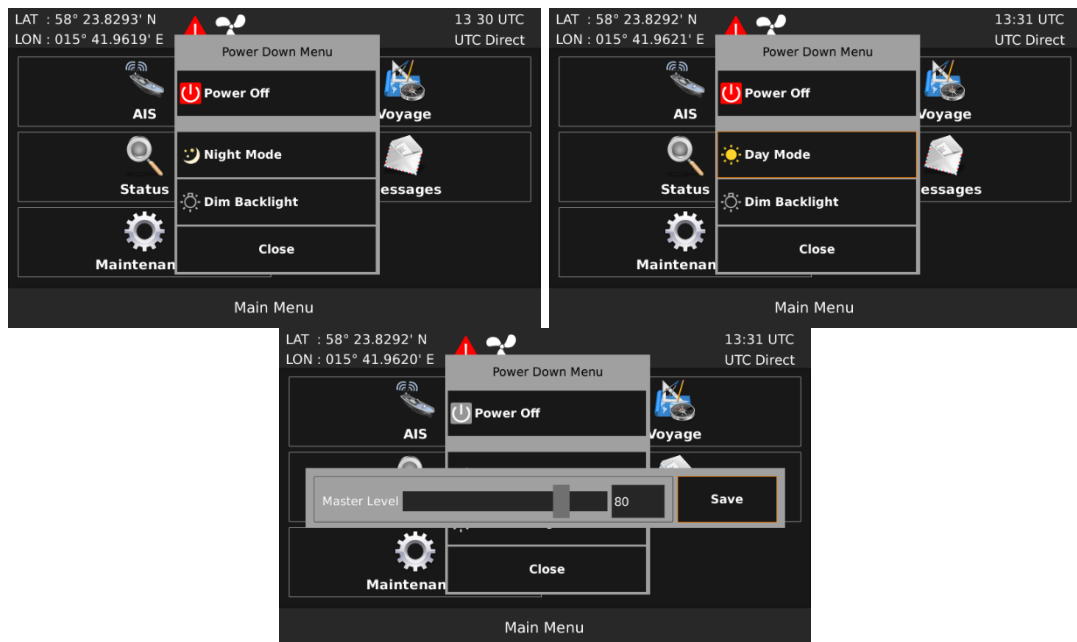


Figure 7 – Power Down Menu

To switch between day/night mode and to tune backlight for buttons, LCD and LEDs, enter the *Visual Settings* view which is accessed from **Main Menu → Maintenance → Configuration → Display → Visual Settings**

Parameter Name	Description
Mode	<p>There are two available display backlight modes; Day/Night.</p> <p>If set to "Day Mode" display parameters related to day mode as described below are used.</p> <p>If set to "Night Mode" display parameters related to night mode as described below are used.</p>



Master Level	The master level controls the overall brightness level in percent of the selected maximum level for LCD Default: 80%
Day Mode LCD Backlight	Controls the maximum LCD backlight level in percent. Default: 80%
Day Mode LED Intensity	Controls the maximum LED intensity level in percent. Default: 80%
Day Mode Button Illumination	Controls the maximum button illumination level in percent. Default: 80%
Night Mode LCD Backlight	Controls the maximum LCD backlight level in percent. Default: 40%
Night Mode LED Intensity	Controls the maximum LED intensity level in percent. Default: 40%
Night Mode Button Illumination	Controls the maximum button illumination level in percent. Default: 40%

5.3.10 Sound

This view is accessed by pressing **Main → Maintenance → Configuration → Display → Sound**

Parameter Name	Description
Alert Volume	Sets the volume of the R5 SUPREME CDU internal speaker.
Long Range Message	Controls the behaviour of the R5 SUPREME CDU speaker when an LR interrogation message is received.
AIS Message	Controls the behaviour of the R5 SUPREME CDU speaker when a SRM or binary text message is received.

5.3.11 Time

This view is accessed by pressing **Main → Maintenance → Configuration → Display → Time**



Parameter Name	Description
Time Zone	This parameter defines if the times that are displayed in the R5 SUPREME CDU should be in UTC or LOC (local) time. If local time is chosen, the offset from UTC must be specified with the three parameters listed below.
Offset sign	The sign of the local time offset from UTC.
Hours	The local time hour offset from UTC.
Minutes	The local time minute offset from UTC.

5.3.12 Units

This view is accessed by pressing **Main → Maintenance → Configuration → Display → Units**

Parameter Name	Description
Range Unit	This parameter determines the unit for the range value of targets in the Target List, Extended Info view and Plot view. Range values can be calculated in nautical miles (NM), kilometres (km) or statute miles (Sm).
Speed Unit	This parameter determines the unit for the SOG value of targets in Extended Info view and Plot view. The SOG values can be calculated in knots (kn), kilometres per hour (km/h) or miles per hour (mph).

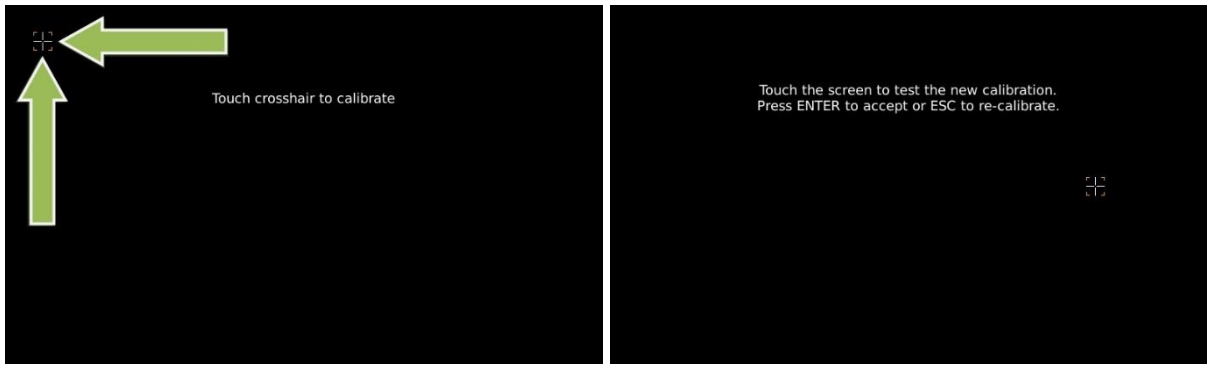
5.3.13 CDU Password

This view is accessed by pressing **Main → Maintenance → Configuration → Display → CDU Password**

Parameter Name	Description
New CDU Password	Changes the password for the R5 SUPREME CDU. The default CDU password is “cdupwd”
Restore Password Key	It is possible to restore the CDU password to the default value above with a secret restore key. To obtain the restore key, contact TransponderTech Support and be prepared to provide the serial number of the R5 SUPREME CDU unit.

5.3.14 Calibrate Display

This view is accessed by pressing **Main → Maintenance → Configuration → Display → Calibrate Display**



A crosshair will be shown on the screen at five different locations. Press on the crosshair each time it appears to calibrate the touch screen. Try to hit the centre of the cross as accurate as possible for the best possible calibration. When the calibration is done, a test screen will appear where the new touch settings can be tested. Press anywhere on the screen to move the crosshair. Accept the new calibration by pressing ENTER on the keypad or press ESC to re-calibrate.

5.3.15 Alert Configuration

This view is accessed by pressing **Main → Maintenance → Configuration → Alert → AIS Alert**

In this view all alerts can be configured to either “Enabled” or “Disabled”. When the alert is enabled, an active alert will affect the external alarm relay as well as the speaker in the R5 SUPREME CDU. When the alert is set to disabled it will not affect anything when the alert becomes active.

For more information about the alert view, refer to chapter 6.18 “Alert List”. For a list of all the alerts that can occur, refer to chapter 9.3 “Troubleshooting with Alert Messages.”

5.3.16 Port Rates

In the Port Rates view it is possible to configure the baud rate for all the serial ports of the R5 SUPREME Transponder and the Pilot Port on the R5 SUPREME CDU. It is also possible to specify if checksum is required for data sent to the specific port.

This view is accessed by pressing **Main → Maintenance → Configuration → Interface → Port Rates → AIS Port Rates**

Parameter Name	Description
Baud Rate	Changes the baud rate (bits per second) for the corresponding serial port.
Checksum	When set to “Required”, all messages that are input on the corresponding serial port to the R5 SUPREME Transponder must have a valid checksum. When set to “Disabled”, messages both with and without checksum are accepted on the corresponding serial port.

NOTE: If a baud rate is set to be lower than 38400 bps on an output port, will no VDM/VDO sentences be output.



5.3.17 Misc Interfaces

This view is accessed by pressing **Main Menu → Maintenance → Configuration → Interface → Misc Interfaces**

Parameter Name	Description
SSD Password	<p>Changes the value of the SSD password level. When set to “None”, no password is required when configuring the transponder with an SSD sentence from e.g. an ECDIS via the serial port interface.</p> <p>When set to “User”, an SPW sentence with the correct user level password must be sent before the SSD on the serial port interface.</p>
Ship Size Mode	<p>This affects how the user should input the ship size, convoy size and antenna positions. See section 5.3.3 for more details.</p>
AIS GPS Output Port	<p>Defines on which serial port the R5 SUPREME should output data from the internal GPS. When set to “None” no internal GPS data will be output.</p>
External Switch	<p>This parameter specifies if there is an external switch connected to the system and the desired system use of the switch.</p> <p>If no switch is used, set the parameter to “No Function”.</p> <p>See section 4.12.9 “External Switch” for more information.</p>
Pilot Port (input)	<p>Pilot port access level. When set to “Disabled”, the possibility to input data to the system through the pilot port is restricted.</p>
AIS Alert ACK Binary Port	<p>The R5 SUPREME transponder has the possibility to connect a binary signal that can acknowledge all alerts at the same time. This can be done by activating the “AIS Alert ACK Binary Port”. The acknowledgement signal can be triggered on either rising or falling edge.</p> <p>See section 4.12.5.1 “Discrete Alert Acknowledgement” for installation details of the ACK binary port.</p> <p>Alerts can also be acknowledged from the R5 CDU or from NMEA input on one of the serial ports. If no binary signal is to be used for acknowledgement, this parameter should be set to “Disabled”.</p>
AIS Alert Serial Output	<p>Defines if the R5 Transponder’s serial ports shall output both/either or none of Legacy alarms (ALR) and Bridge Alert Management alerts (ALF/ALC).</p>



Hot Standby Function	Enables/Disables the Hot Standby functionality described in section 4.13. It is important that one transponder is configured as “Primary” and the other transponder in hot standby pair is configured as “Secondary” for the hot standby function to work properly.
Hot Standby Port	The port designated for hot standby functionality described in section 4.13. If hot standby functionality is enabled, this port cannot be used for anything else than synchronization with the other transponder in the hot standby pair.

5.3.18 Own CDU Settings (Network)

This view is accessed by pressing **Main Menu → Maintenance → Configuration → Interface → Network → Own CDU Settings**

Parameter Name	Description
CDU IP Address	The Internet Protocol (IP) address of the R5 SUPREME CDU.
CDU SFI	<p>The unique ID that is used on the network. For example if this parameter is set to “3141” the R5 SUPREME CDU will transmit messages on the network with the SFI “SN3141”.</p> <p>This ID must be unique for all equipment connected to the same network.</p> <p>The system will not allow the SFI SN9999, due to consideration that “System Function Identity” is improper during normal operation.</p>

5.3.19 Transponder Settings (Network)

This view is accessed by pressing **Main Menu → Maintenance → Configuration → Interface → Network → Transponder Settings**

Parameter Name	Description
IP Address	The Internet Protocol (IP) address of the R5 SUPREME Transponder.



SFI	<p>The unique ID that is used on the network. For example if this parameter is set to “3142” the R5 Transponder will transmit messages on the network with the SFI “AI3142”.</p> <p>This ID must be unique for all equipment connected to the same network.</p> <p>The system will not allow the SFI AI9999, due to consideration that “System Function Identity” is improper during normal operation.</p>
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5.3.20 Transponder Network Input (sensors)

This view is accessed by pressing **Main Menu → Maintenance → Configuration → Interface → Input → Transponder Network Input**

Configuration in this view allows for connection of GNSS, heading and ROT equipment to the R5 Supreme transponder using the network interface.

For each data type, enter the SFI for each external system that the Transponder shall connect to. For example if Primary position source is set to “GP3210” the R5 SUPREME Transponder will accept position data on the network from systems with the SFI “GP3210”.

Parameter Name	Description
Position Primary Source	Set to SFI of primary position source
Position Secondary Source	Set to SFI of secondary position source
COG + SOG Primary Source	Set to SFI of primary COG + SOG source
COG + SOG Secondary Source	Set to SFI of secondary COG + SOG source
Rate of Turn Primary Source	Set to SFI of primary Rate of Turn source
Rate of Turn Secondary Source	Set to SFI of secondary Rate of Turn source
Heading Primary Source	Set to SFI of primary Heading source
Heading Secondary Source	Set to SFI of secondary Heading source



5.3.21 Installation Test

This view is accessed by clicking **Main Menu** → **Maintenance** → **Functional Test** → **Installation Test**

Parameter Name	Description
Sensor Data Source	<p>This parameter specifies which port the R5 SUPREME Transponder should currently use as its external position source. The default value of this parameter is "Automatic" which means that the R5 SUPREME Transponder will accept position information on any port and use the information on the port with highest priority.</p> <p>If Position Source is set to anything other than "Automatic", the R5 SUPREME Transponder will only accept position information if it comes from the port specified by this parameter.</p> <p>This parameter can be used to test incoming data on a specific sensor port. The R5 SUPREME Transponder will automatically revert to "Automatic" on reboot.</p>
Locating Device Test Mode	<p>This parameter determines if Locating Device Test targets should be displayed in Target List and Plot views of the R5 SUPREME CDU.</p> <p>It also controls if connected systems, for example ECDIS, will receive Locating Device Test targets.</p>



6 OPERATION

6.1 General usage

The system can be fully operated using the R5 SUPREME CDU. The CDU is operated using the touch sensitive screen, or the backlit keypad. Some ECDIS systems may also allow for normal AIS usage.

Apart from observing received AIS targets, normal interfacing with the system involves:

- Updating voyage related parameters
- Updating navigational status
- Verifying alerts
- Sending/receiving text messages.

The CDU Front hatch covers an integrated AIS Pilot Plug connector. This hatch can be locked shut if needed. We recommend a flat tip 5.5-6.5mm screwdriver for locking/unlocking the hatch.

6.2 LED's on R5 SUPREME Transponder



1 - STATUS LED (multi-colour)

- Constant green when the transponder is operating and no alerts are active.
- Constant red if there is an active alert.
- Flashing red if there is an unacknowledged alert.

2 - RX LED (yellow)



- Flashes yellow when the transponder receives a message on the VHF link.

3 - TX LED (red)

- Flashes red when the transponder transmits a message on the VHF link.

4 - Ethernet LED (green)

- Constant green when an Ethernet cable is connected
- Flashes green when data is transferred.

6.3 LED's and Controls on R5 SUPREME CDU

This section describes the controls and status LED's on the front of the R5 SUPREME CDU.



1 - STATUS LED (multi-colour)

- Constant green when the transponder is operating and no alerts are active
- Constant red if there is an active alert
- Flashing red if there is an unacknowledged alert

2 - RAIM LED (multi-colour)

Not used in standard R5 SUPREME AIS System. Only used in Navigation System enabled installations.

3 - MODE LED (multi-colour)

Not used in standard R5 SUPREME AIS System. May be used in other product variants, see product variant specific documentation.

4 - LS

Not used in this product.



5 - ARROW KEYPAD and ENTER

The easiest way to navigate in menus, lists and edit fields in the R5 SUPREME CDU is by using the touch interface. However, the arrow keypad and ENTER button can also be used to control the R5 SUPREME CDU in e.g. rough seas. The arrow keypad (< > and ^ v) is used to navigate in menus, lists and edit fields. The centre button of the keypad is an ENTER button which is used to select the highlighted choice in a menu, list or edit control.

6 - PWR

The power button on the R5 SUPREME CDU is used to turn off the display and can also be used to quickly change the settings for backlight of LCD, buttons and LEDs.

- A quick press of the **PWR** button will turn off all backlight but the R5 SUPREME CDU will still be running. If there is an active, unacknowledged alert in the system, the STATUS LED will still be blinking red. Otherwise all LED's will be turned off.
- If the PWR button is pressed for more than two seconds, a "Power Down Menu" will appear. Here it is possible to power off the R5 SUPREME CDU completely or to quickly change the backlight percentage for the LCD, LEDs and buttons.

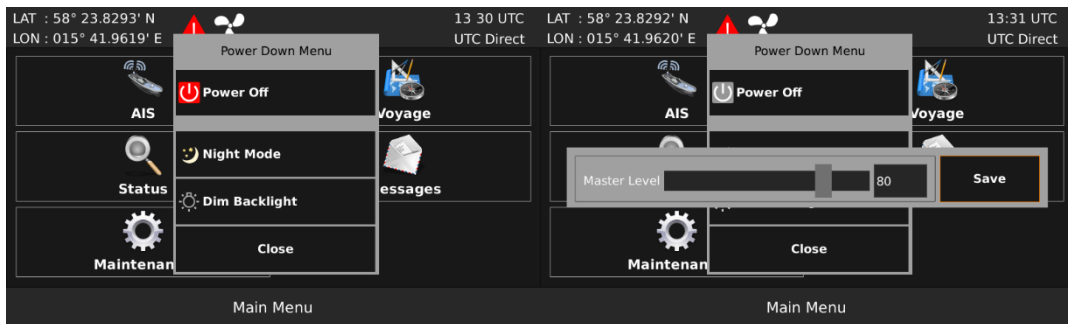


Figure 8 – Power Down Menu

- If the PWR button is pressed for more than fifteen seconds, the CDU will perform a hard reboot.

7 - OPT

This button is an "Option key" which is only active in some of the views. When pressed, it gives the user a list of options that can be performed on the highlighted item.

In screens with parameters, the **OPT** button can be used to set the parameter to default value.

If the **OPT** button is pressed for more than 5 seconds, the visual settings will be restored to default, i.e. LCD backlight, LED intensity and button backlight will all be 80% and day mode will be used.

8 - MOB

Not used in the plain R5 SUPREME AIS System. Only available in Navigation System enabled installation.

9 - ESC

Used to return to previous screen or to cancel an edit change of a data field.

6.3.1 Change Settings of a Parameter

Several of the views in the R5 SUPREME CDU contain parameters that can be edited. To edit a parameter, click on it using the touch interface. A virtual keyboard will appear where it is possible to enter data. Click on the enter button of the virtual keyboard when the data input is done. To save all the changes made in the current view, press the Save button in the lower right corner of the screen.

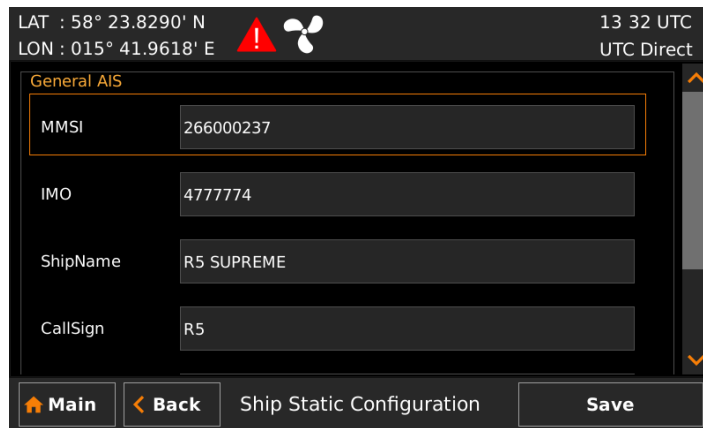


Figure 9 – Example of a parameter view

It is also possible to use buttons on the front of the R5 SUPREME CDU to select and change a parameter. Use the **ARROW KEYPAD** to select a parameter, the currently selected parameter will be marked with an orange rectangle (see figure above). Press **ENTER** to popup the virtual keyboard. Use the **ARROW KEYPAD** to highlight the desired character and press **ENTER** to select it. Navigate to enter button of the virtual keyboard and press **ENTER** when done.

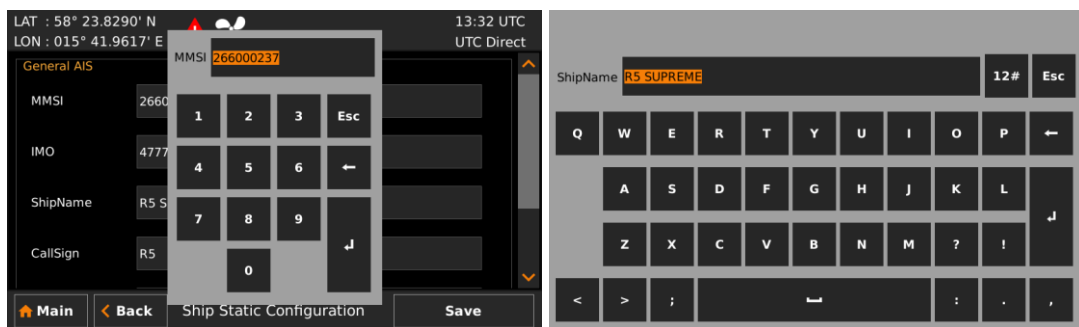
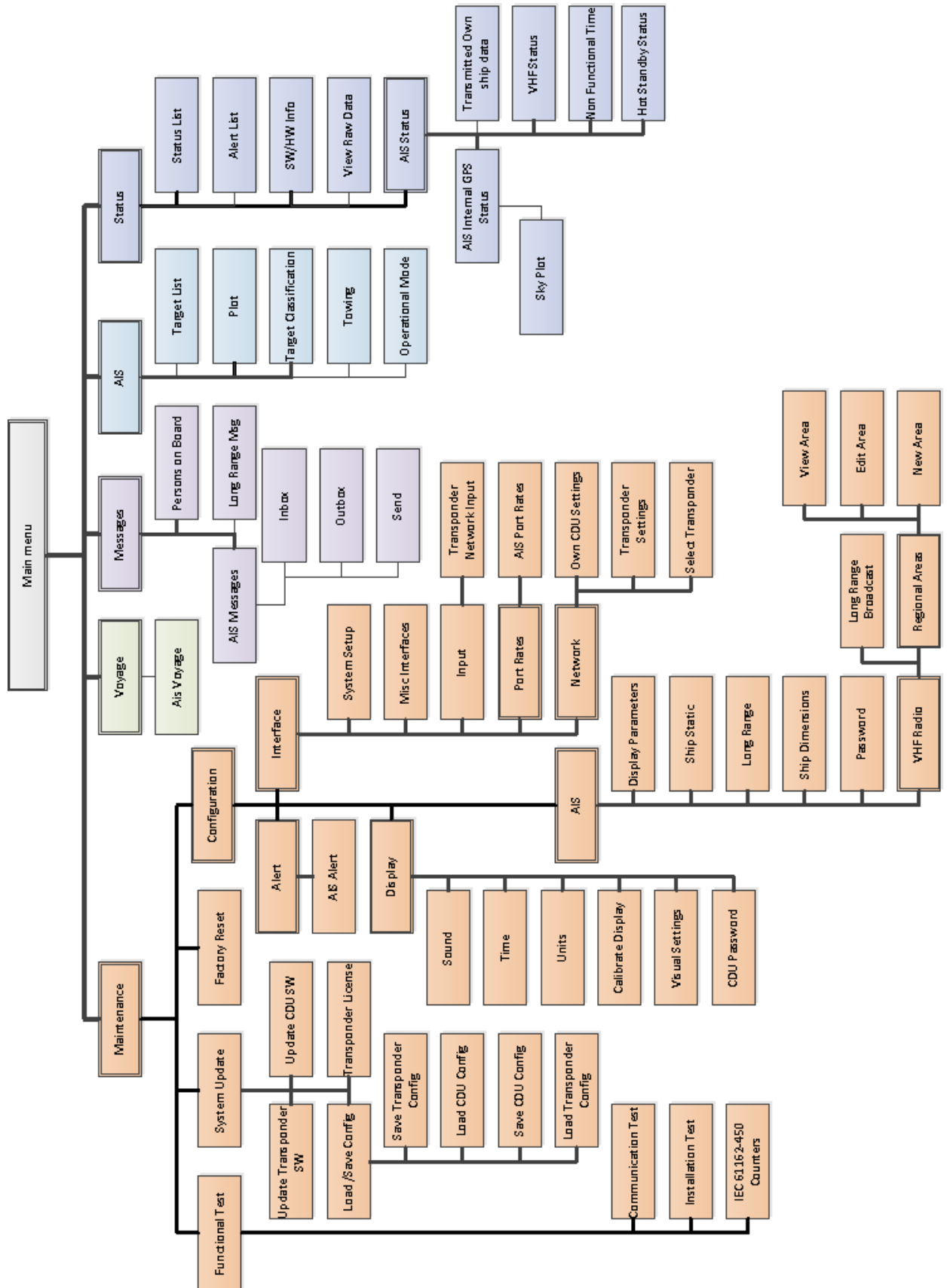


Figure 10 – Example of virtual keyboards



6.4 Menu Structure – Tree view





6.4.1 Navigating in Menus

To navigate in the R5 SUPREME CDU menus, simply press the menu button corresponding to the desired view using the touch interface, or use the **ARROW KEYPAD** buttons **<** **>** and **Λ** **V** to navigate between the view buttons. The currently selected button will be marked with an orange outline. Press the **ENTER** button to enter the currently selected view. In the lower left corner of a view there is also a Back button to quickly go back to previous view and a Main button to go directly to the Main Menu view.

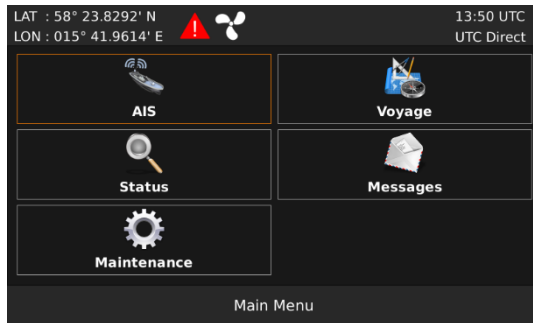


Figure 11 – Main Menu

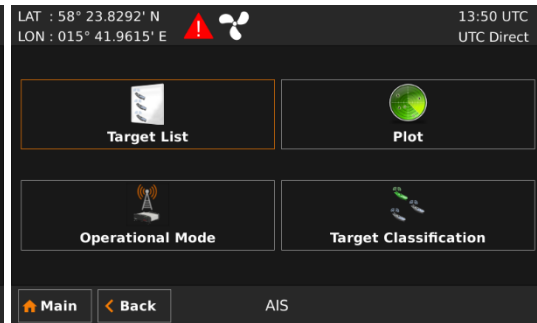
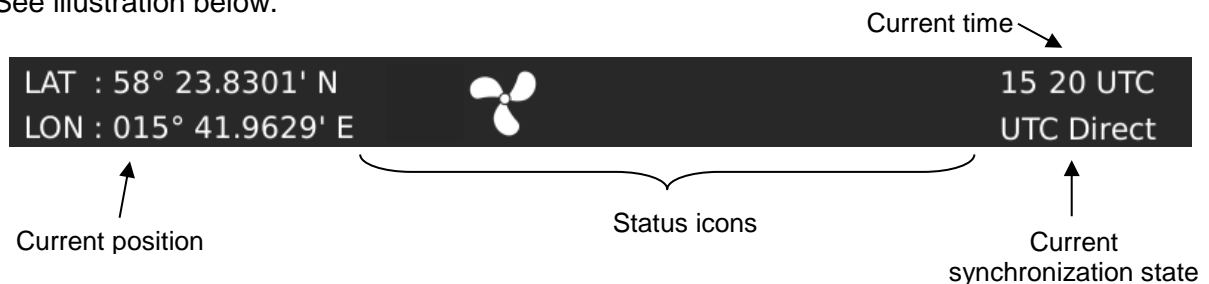


Figure 12 – AIS Menu

6.5 Status Bar

The top of the screen of the R5 SUPREME CDU always displays a summary of the system's status. See illustration below.



If a valid navigation position is available, it is displayed to the left. The status icons are displayed in the middle and the current time is shown to the right. Time is either UTC or local (LOC). Beneath the current time there is also information about the transponder's synchronization state. The synchronization state can be:

- **UTC Direct** – This is the normal state where the R5 SUPREME Transponder gets the UTC time from its own internal GPS receiver.
- **Indirect Synchronization** – The R5 SUPREME Transponder is synchronizing based on receipt of data from other AIS transmitters.

NOTE: It is possible to be in Indirect Synchronization but still have a valid position in the upper left corner of the status bar. The position information may be from an external GPS sensor, but UTC Direct synchronization can only be taken from the internal GPS receiver.

Note: The only time the R5 SUPREME AIS system does not have, UTC synchronization, is when the unit has been rebooted/power cycled and not received any GNSS/GPS signals.

6.6 Alerts

If the R5 SUPREME AIS system detects a malfunction or operational issue, an alert will be raised, indicated by an alert icon in the status bar (see section 6.7) and possibly audible signals.









The significance of an alert is presented with their different priority levels, some requiring immediate attention and an acknowledgement, some not.

To acknowledge alerts requiring acknowledgement or just see an overall view of all raised alerts, the user needs to navigate to the “Alert List” view and if necessary perform actions by follow the instructions in section 6.18.

Note: For more detailed information about alert types and they affect the system, see section 6.19













6.7 Status Icons

Alert status icon:

-  Active unacknowledged warning (flashing)
-  Active silenced warning (flashing)
-  Active acknowledged warning
-  Active caution
-  Active unacknowledged notification
-  Active acknowledged notification

Note: The list shows all alert icons priorities in falling order. No alert classified as alarm will occur in a pure AIS system. For quick access to the Alert List, press the icon.



Navigational status, being one of:

- | | |
|--|---|
|  Navigational status is undefined |  Not under command |
|  Under way using engine |  Restricted maneuverability |
|  Under way sailing |  Constrained by her draught |
|  At anchor |  Aground |
|  Moored |  Power-driven Vessel Towing Astern |
|  Engaged in fishing |  Power-driven Vessel Pushing Ahead or Towing Alongside |

Press the Navigational Status icon for quick access to the Navigation Status selection view.

Note: The transponder will automatically engage 1W mode when the following conditions are met: Ship type = Tanker, Nav Status = Moored and SOG <= 3 knots, otherwise 1W mode will be automatically disengaged. The Tanker 1W mode is fully automatic and cannot be disengaged by other external control.

Other status icons that can be displayed are:

-  Unread message (safety related message, text message or RTA)
-  Unread Long Range message (automatic reply)



Unread Long Range message (manual reply)



1W mode (Indicates 1 Watt TX mode for Tankers is enabled). See NOTE above for details.



Silent Mode activated, by either Tx Mode parameter or silent switch.

6.8 View Remote Ship Information

The R5 SUPREME AIS System will power up in *Target List* view. This view is accessed from **Main Menu → AIS → Target List**.

The *Target List* view displays a list of all AIS targets received on the VHF link. The list includes MMSI or ship's name (Ship ID), range (RNG), bearing (BRG) and time since last report was received (Age) for each AIS target received by the system.

Ship ID	Bearing	Range	Age
▲ EK-RIVER	68.7 °	112 NM	00:07
▲ EMS HIGHWAY	195.2 °	64.7 NM	00:03
▲ EVA-320	79.3 °	148 NM	00:23
▲ FALCON	16.4 °	93.6 NM	00:02
▲ FALSTER	192.8 °	42.3 NM	00:10
▲ FEDERAL FUJI	143.3 °	58.8 NM	00:04
▲ FINNREEL	34.1 °	78.2 NM	00:07
▲ FLINTERBORG	100.4 °	41.2 NM	00:35
▲ FREDRIKA	278.5 °	60.3 NM	00:01

Navigation: Main | Back | AIS Target List | Extended Info

Figure 13 – Target List

The **OPT** button can be used as a shortcut to send an SRM or TXT message or to add a classification to a selected target in the list,

For extended information about a target in the list, select the desired target in the list and then press the “Extended Info” button to enter the *Extended Information* view.

The *Extended Information* view includes static, dynamic and voyage related data for the selected target. Press the button “Next Page” to switch between the pages of extended information

Navigation: Main | Back | Extended Target Info

LAT : 58° 30.0000' N		09:20 UTC	
LON : 018° 30.0000' E		UTC Direct	
Target Identification		Class A	
MMSI	265865000	Name	VISBY
		Callsign	SGPH
Static Data			
IMO	9223784		
Country (MID)	Sweden (265)		
Ship Type	Passenger Ship		
Beam	24 m C: 12 D: 12		
Length	195 m A: 10 B: 185		
Next Page			



Figure 14 – Extended Info

It is possible to press **OPT** button in Extended Info view to query for Static and Voyage Data and Persons on Board information.

Press “Back” button in the lower left corner to return to *Target List* view.

6.9 View Plot of Targets

The location of targets relative to your own ship is visualized in the *Plot* view. The view is accessed from the **Main Menu** → **AIS** → **Plot**.

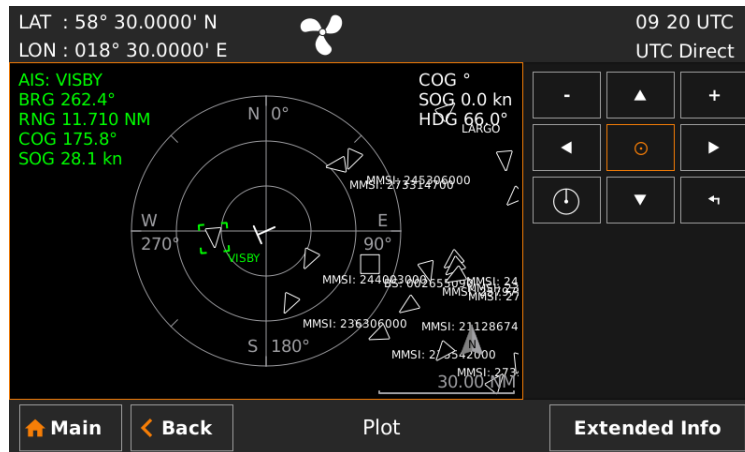


Figure 15 – Target Plot

To send an SRM or TXT message to a vessel, select the desired target in the plot and press the **OPT** button.

For extended information about a target select it in the plot and press the “Extended Info” button in the lower right corner.

It also is possible to press **OPT** button in Extended Info view to query for Static and Voyage Data and Persons on Board information.

The own ship target is displayed as a ‘T’ shaped symbol. Class B targets are indicated by a ‘B’ appended to the target icon and Inland targets are indicated by either an ‘I’ or by a blue sign symbol appended to the target.

6.9.1 Plot Buttons

- | | | | |
|--|---------------------------------|--|-------------------------------|
| | Pan up | | Zoom out |
| | Pan down | | Zoom in |
| | Pan left | | Plot orientated north up |
| | Pan right | | Plot orientated head up |
| | Move free in plot | | Reset plot to default setting |
| | Center and lock on own position | | |



6.10 Target Classification

Received AIS targets can be assigned a classification that will be displayed in a different colour in target list and target plot view.

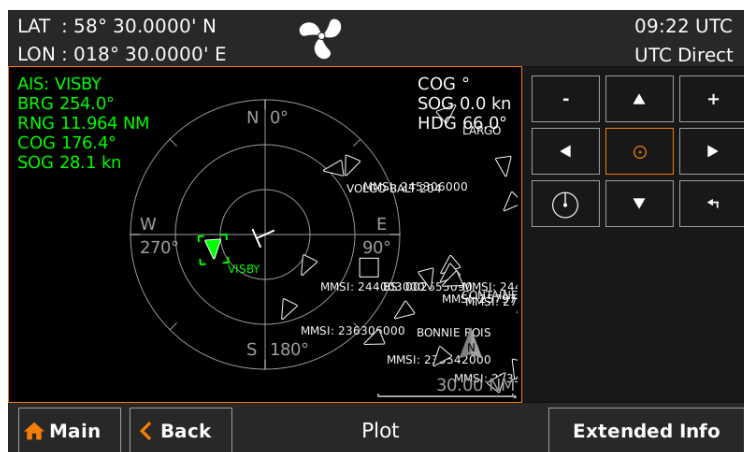
LAT : 58° 30.0000' N
LON : 018° 30.0000' E

09 23 UTC
UTC Direct

Number of Targets: 414

Ship ID	Bearing	Range	Age
MMSI: 244003000	131.3 °	11.7 NM	00:14
▲ VISBY	247.3 °	12.4 NM	00:01
▲ UNIMAR	165.7 °	18.0 NM	00:05
▲ VOLGO-BALT 204	45.7 °	20.8 NM	00:28
▲ WISBY VERITY	292.2 °	21.5 NM	00:05
▲ MMSI: 245306000	51.8 °	23.6 NM	00:16
■ BS: 002655090	107.7 °	24.2 NM	00:14
▲ PILOT 111 SE	306.9 °	24.7 NM	00:12
▲ PILOT 358 SE	306.8 °	24.7 NM	00:01

Main Back AIS Target List Extended Info



The Extended Info view shows the target classification in the classification colour in the Target Identification group.

LAT : 58° 30.0000' N
LON : 018° 30.0000' E

09:22 UTC
UTC Direct

Target Identification **Friend** Class A

MMSI 265865000 Name VISBY Callsign SGPH

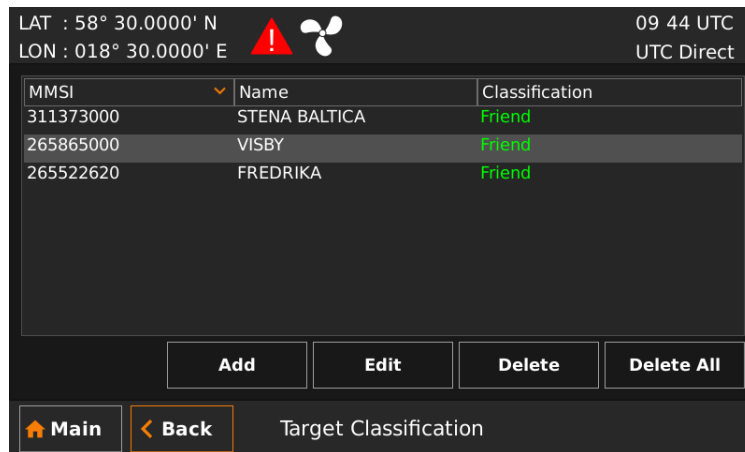
Dynamic Data (1/2)

BRG 252.7 °	ROT 0 °/min (right)	Latitude 58° 26.3713' N
RNG 12.0 NM		Longitude 018° 08.1122' E
COG 176.4 °		Quality Position < 10m
SOG 28.2 kn		Sensor GPS
HDG 176°		

Next Page

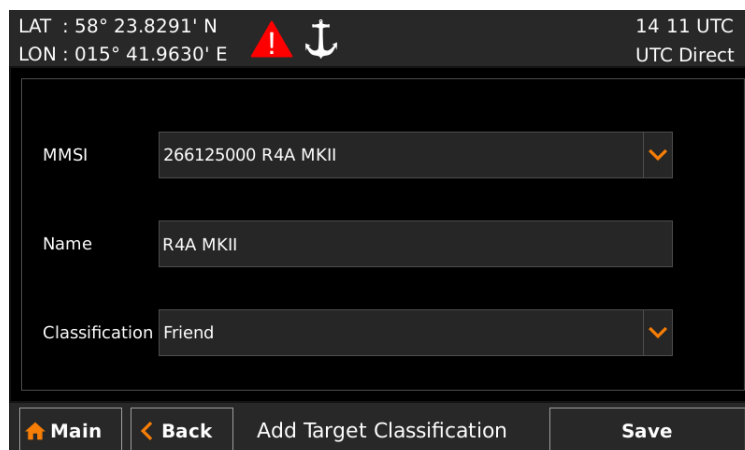
Main Back Extended Target Info

Target classification configuration is accessed from **Main Menu → AIS → Target Classification**.



Press Add button to add a new target classification. Select a target from the drop down list. If a target name is received, the name field is automatically filled in with the target name. The name field is editable to allow for a custom target label. Select a classification from the classification drop down list.

Target classifications can also be added by selecting a target in the target list view or target plot view and pressing the OPT button. From the popup menu, select Target Classification.



To edit or delete a target classification, select a target from the list view and press either edit or delete.

6.11 View Transmitted Own Ship Information

The information transmitted by the R5 SUPREME Transponder on the VHF link is viewed in the *Transmitted Own Ship Data* view. This view is accessed from **Main Menu → Status → AIS → Transmitted Own Ship Data** and includes the static, dynamic and voyage related data actually sent by the R5 SUPREME Transponder. The view reflects the contents of the last transmitted AIS messages, thus there may be some delay from the time the parameters are changed until they are displayed in the *Own Ship Data* view.



The screenshot shows the 'Transmitted Own Ship Data' screen. At the top, it displays coordinates: LAT : 58° 30.0000' N and LON : 018° 30.0000' E, along with a red warning triangle and a propeller icon. The time is 09:46 UTC, UTC Direct. Below this is the 'Own Ship Identification' section with fields for MMSI (266000237), Name (R5 SUPREME), and Callsign (R5). The 'Dynamic Data (1/2)' section includes: ROT (0 °/min (right)), Latitude (58° 30.0000' N), COG (335.0 °), Longitude (018° 30.0000' E), SOG (0.0 kn), Quality (Position < 10m), HDG (66°), and Sensor (GPS). A 'Next Page' button is at the bottom right. The bottom navigation bar contains 'Main', 'Back', and 'Transmitted Own Ship Data'.

Figure 16 – Transmitted Own Ship Data

6.12 Enter and Read Voyage Related Information

Voyage related information (for transmit via AIS) is displayed in the *AIS Voyage* view. The view is accessed from **Main Menu → Voyage → AIS Voyage**. Voyage related data includes destination, estimated time of arrival (ETA) and number of people aboard.

The screenshot shows the 'AIS Voyage' screen. It displays the same coordinates and time as Figure 16. The 'Navigation Status' is set to 'Under Way Using Engine' with a dropdown arrow. The 'ETA (M-D H:M)' is '03-06 12:00 UTC' with a checkmark. The 'Destination' is 'VISBY'. The 'Draught' is '3.0 m'. The bottom navigation bar contains 'Main', 'Back', 'AIS Voyage', and 'Save'.

Figure 17 – AIS Voyage

6.13 Extended Tow Dimension Values

Extensions to the normal ship dimensions (configured according to section 5.3.3) can be entered in the *Extended Dimensions* view. The view is accessed from **Main Menu → AIS → Towing**.

These dimensions are added to the normal ship dimensions, output in static data and voyage report (message 5), when navigational status is “Power driven vessel pushing ahead or towing alongside” (navstatus 12).

A popup notification is provided after selection of navstatus 12. The user is reminded to check proper setting of extended dimensions and adjust them if necessary.

A popup notification is also provided if extended dimensions are set to zero during navstatus 12

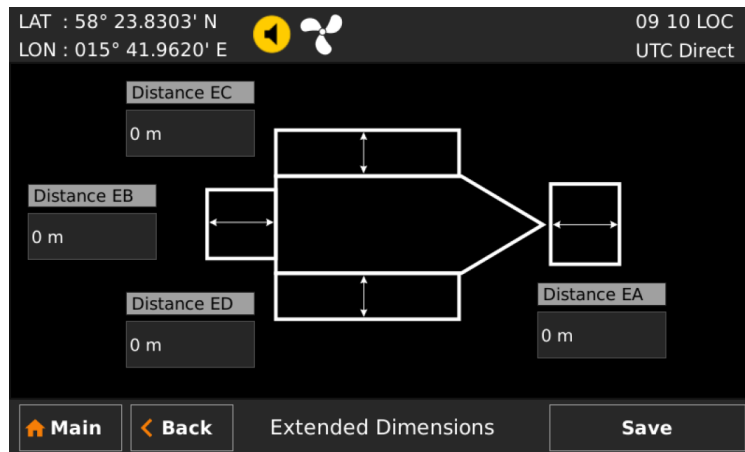


Figure 18 – Extended Dimensions

6.14 Handling Safety Related Messages (SRM) and Text Messages

Safety related messages (SRMs) and text messages can be sent to specific targets (addressed messages) or broadcast to all targets. The *Inbox*, *Outbox* and *Send* views for SRMs and text messages can be accessed from **Main Menu → Messages → AIS Messages**.

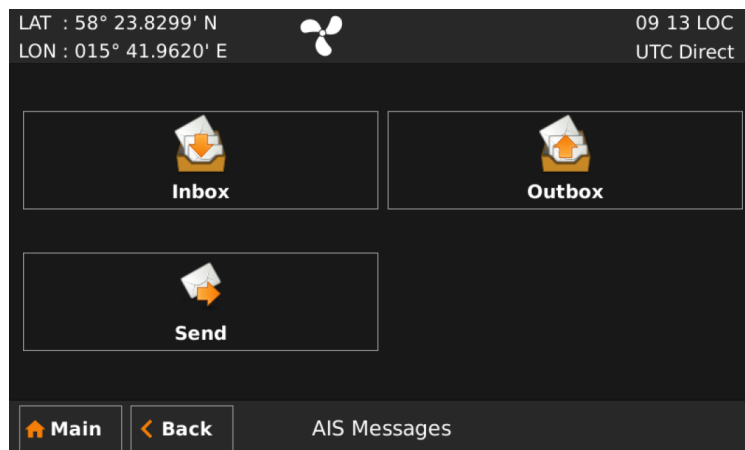


Figure 19 - AIS Messages

6.14.1 Read Received Messages

Received messages can be accessed in the *Inbox* view. Unread SRMs and text messages are indicated with an envelope icon in the status bar. In the *Inbox* view unread messages are marked with a closed envelope while read messages are marked with an open envelope.

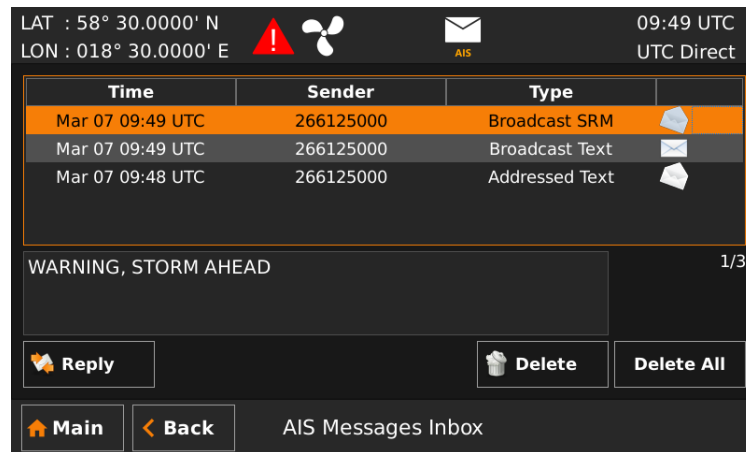


Figure 20 – AIS Message Inbox

6.14.2 Send SRMs and Text Messages

SRMs are composed and sent in the *Send* view accessed from **Main Menu → Messages → AIS Messages → Send**. It is also possible to select a target in the Target List view or the Plot view and press the **OPT** key to address a message to a specific unit.

Note: A message with the text “Target may not display message” will be shown if the addressed target indicates that display functionality not is available (DTE flag).

To write a message, click in the text edit area to the left or use the **ARROW KEYPAD** to mark the text area and press **ENTER**. This will show the virtual keyboard where the message can be entered. Click on the ENTER button of the virtual keyboard when done.

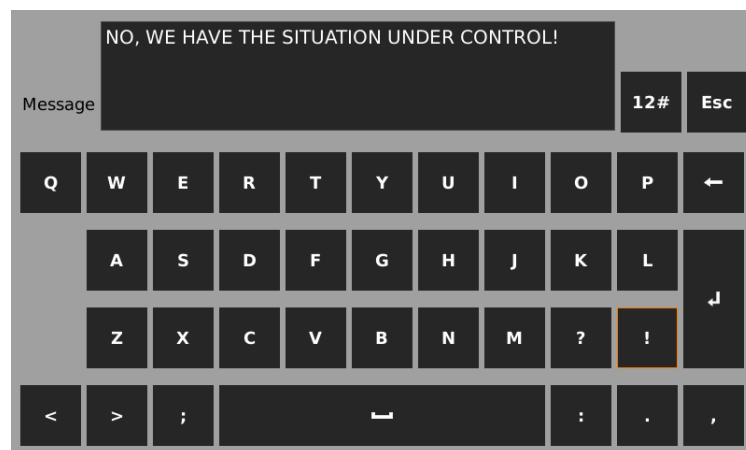


Figure 21 – Virtual Keyboard

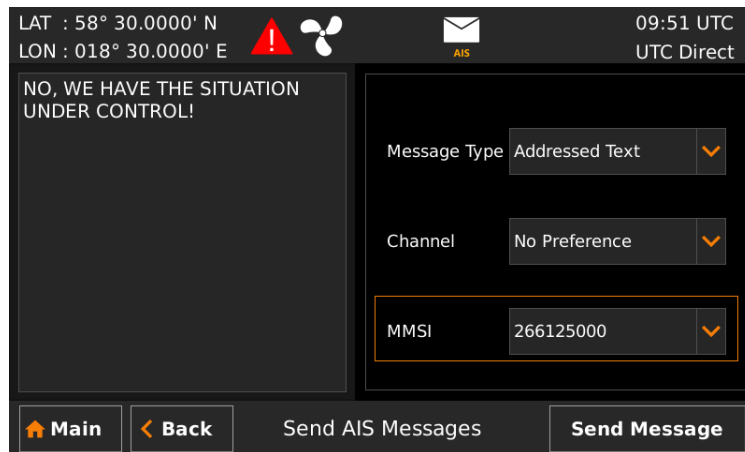


Figure 22 – AIS Message Send view

Sent messages can be viewed in the *Outbox* view accessed from **Main Menu → Messages → AIS Messages → Outbox**.

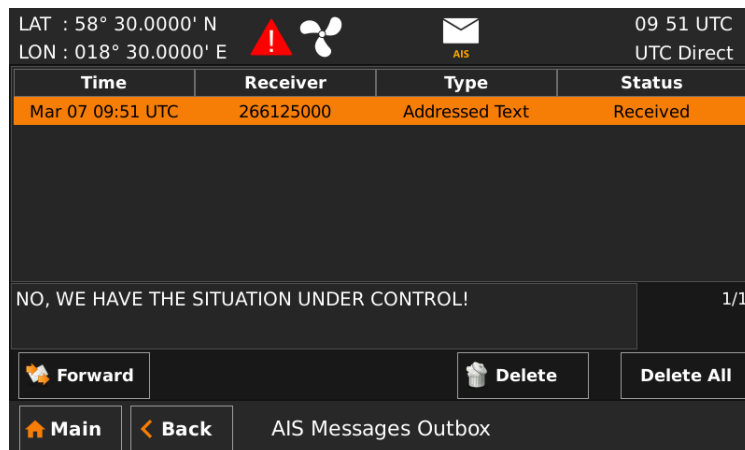


Figure 23 – AIS Message Outbox

6.15 Send Persons On Board

The *Persons On Board* view is accessed from **Main Menu → Messages → Persons on Board**. It is possible to send information about number of persons on board (PoB) to another vessel. The PoB message can be sent as either addressed or broadcast.

The information sent in the messages is automatically filled in by the R5 SUPREME AIS System depending on the voyage configuration made in **Main Menu → Voyage → AIS Voyage**.

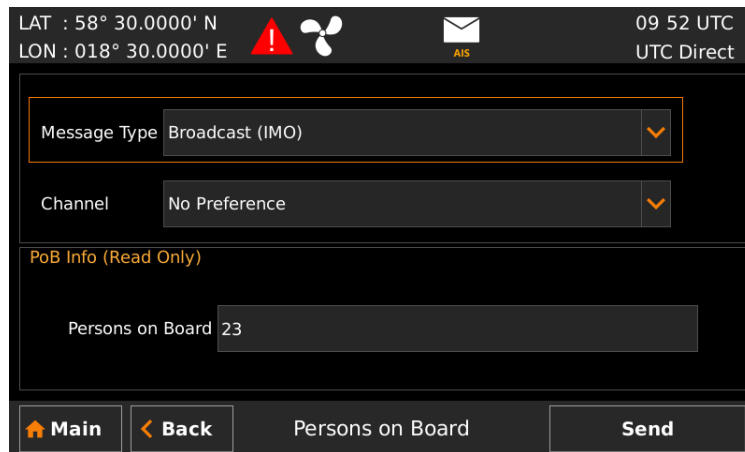


Figure 24 – Persons On Board

6.16 Long Range Interrogations

An AIS transponder can receive long range interrogation messages to poll for certain information. A received interrogation message is indicated by a LR icon in the status bar. If the “Long Range Reply Mode” parameter has been configured to “Auto”, the R5 SUPREME Transponder will automatically send a response to the interrogation. If the “Long Range Reply Mode” parameter is set to “Manual”, the operator must send a response or refusal from the *Long Range Message* view accessed from **Main Menu → Messages → Long Range**. For more information about the “Reply Mode” parameter and Long Range filter settings, see section 5.3.6.

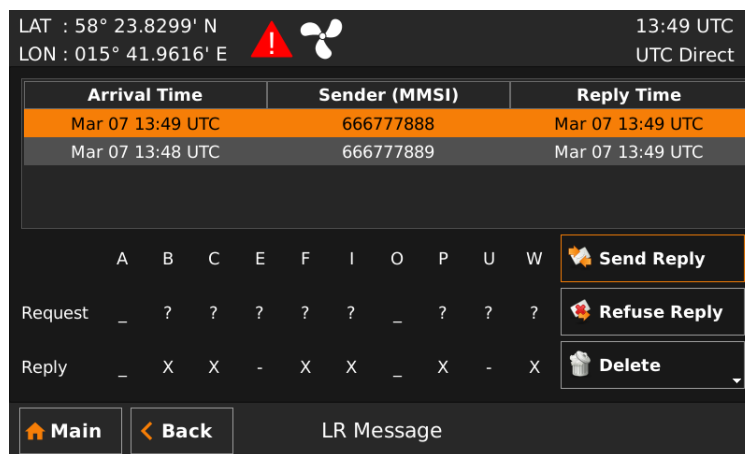


Figure 25 – Long Range

To send a reply or refusal to the interrogation or to delete an interrogation from the message list, click on the message in the list view to mark it and then click on one of the buttons “Send Reply”, “Refuse Reply” or “Delete”. When using the **ARROW KEYPAD**, use the buttons \wedge \vee to navigate to the message list and press **ENTER**. Mark the desired interrogation by again using \wedge \vee and then press **ESC** button to be able to navigate to the desired button using the **ARROW KEYPAD** (\wedge \vee , $<$ $>$). Press **ENTER** when the desired button is marked with orange frame and orange text (see “Send Reply” button in picture above).

The *Long Range* view uses the following symbols to indicate the status of a request or reply message:

- ? – The information is requested by the sender
- X – The information is available and provided



! – The information requested is refused

6.17 Regional Areas

Regional Area messages are transmitted from shore based AIS Base Stations by local authorities to control AIS VHF settings of AIS transponders within a defined area. The transponder will store up to eight different areas. An area will timeout and be deleted 24 hours after it was last received, or if the distance to the area becomes greater than 120 NM.

All regional areas that are stored in the R5 SUPREME Transponder can be viewed in the *Regional Areas* view which is accessed from **Main Menu → Maintenance → Configuration → AIS → VHF Radio → Regional Areas**. The list shows the north east and south west corners of the areas. The area is marked with green colour if it is in use by the R5 SUPREME Transponder. To view the settings of an area or to edit an existing area, mark the area in the list and click on the “View Area” or “Edit Area” button. When using the **ARROW KEYPAD**, mark the area list and then press **ENTER** to be able to select the desired area with **Λ V**. When the correct area is selected, press **ESC** and use the **ARROW KEYPAD** to navigate to the desired button.

It is possible to manually create and edit regional areas in the system. It is not recommended to modify anything in this view unless instructed to do so by the authorities or for testing in a controlled environment.

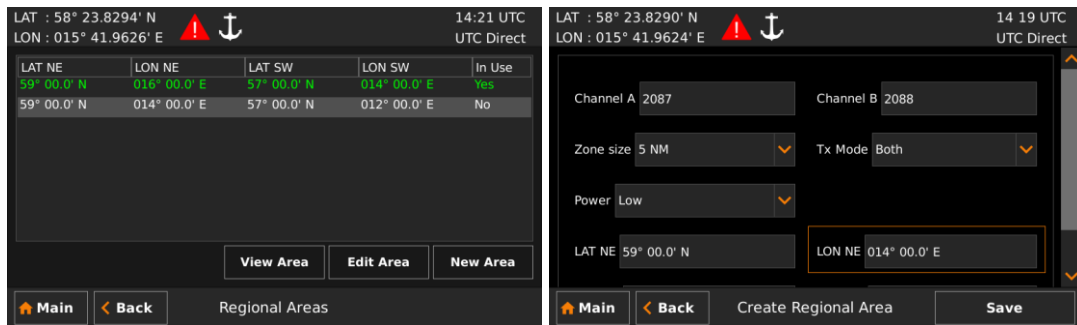


Figure 26 – Regional Areas



6.18 Alert List

All currently active and enabled alerts are shown in the *Alert List* view that can be accessed from **Main Menu** → **Status** → **Alert List** or by clicking on the alert indication in the status bar. For a list of all alerts, see section 6.19.5.

When selecting an alert, extended information will be shown in the bottom of the view. For a list of all alerts and there extended information, see section 6.19.5 and 9.3.

If selecting an unacknowledged/silenced alert in the list the “Acknowledge” button in the right down corner will be enabled, allowing the user to acknowledge the alert. In other cases the “Acknowledge” button will stay disabled (alert already acknowledged or requires no acknowledgement).

Note: Not all alerts require acknowledgement.

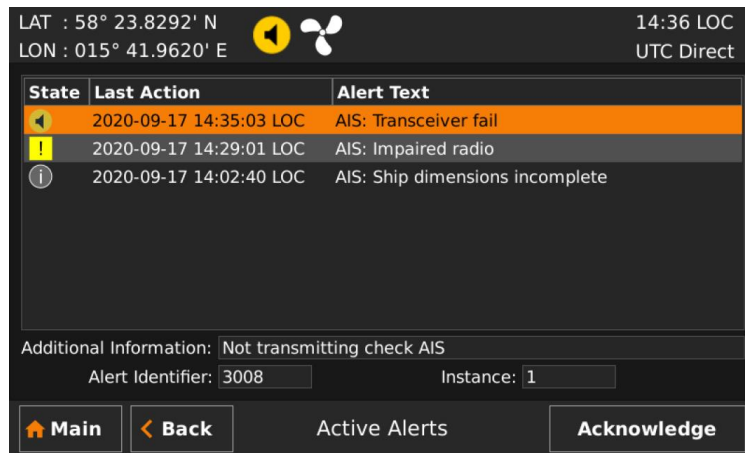


Figure 27 – Alert List

6.19 Alert Status

The R5 SUPREME AIS system is a “Bridge Alert Management” and “Legacy Alert” compliant system of “Type P” according to IEC 62923-1 ed.1. Capable of handling and generating necessary information for communication with old as well as new systems.

All active alert in the R5 CDU are both presented visually and by audio signals according to BAM (IEC 62923-1 ed. 1). The visual icons used for representing the alert states in both the “Alert List” –view and the “Status Bar”, can be seen in section 6.5. The audio signals behaviour is described below.

6.19.1 Priority

Each alert is prioritized to one of following priorities:

- **Emergency Alarm** – Highest priority alert. Not used by any R5 SUPREME system.
- **Alarm** – Next highest alert level there is, not occurring in a pure R5 SUPREME AIS system, requiring immediate attention and action. Unacknowledged alarm causes a three beeps audio signal every 7.5s.
- **Warning** – Condition requiring immediate attention, but no immediate action. Unacknowledged and escalated warning results in a two beeps audio signal. (Warnings escalates every two minutes as long as they are “Active Unacknowledged”).



- **Caution** – Lowest alert level, requiring awareness out of the ordinary consideration of the situation or of given information and does not cause any audio signal.
- **Notification** – Non-alert level not causing any audio signal.

Note: Legacy alerts received in form of ALR sentence inputs are handled as priority level “Warning”.

6.19.2 Category

Each alert is categorized to one of following classes:

- **A** – Alert for which graphical information at the task station directly assigned to the function generating the alert is necessary, as decision support for the evaluation of the alert related condition.
- **B** – Alert where no additional information for decision support is necessary besides the information which can be presented at the central alert management interface.
- **C** – Alert that cannot be acknowledged on the bridge but for which information is required about the status and treatment of the alert.

Note: The R5 SUPREME AIS system only generates alerts of category B.

6.19.3 Grouping and Aggregation

The R5 SUPREME AIS system does not apply these features.

6.19.4 Alert Commands

This section describes the effect of commands as applicable on alerts in the R5 SUPREME AIS system.

6.19.4.1 Acknowledgement

By acknowledgement of an active or silenced alert, the alert will still be present but not able to escalate or cause more audible alert signals. If the alert is in any other state the command will have no effect on the alert.

6.19.4.2 Silence

By silencing an active alert it will still be present and unacknowledged but will be prevented from causing audible signals for 30 seconds. If the alert is in another state the command will not effect on the alert.

Note: The CDU does not provide the functionality of this operation; it requires an external action/input of, for example, a CAM system.

6.19.4.3 Query

Equipment integrated to R5 SOLID AIS may require more additional information on statuses of the alert status of the system, This is done via queries. Any received queries will not affect the status of alerts, but will generate an extra data output.

6.19.4.4 Responsibility transfer

The R5 SUPREME AIS system does not use this command.



6.19.5 Alert Identification List

In “Table 10 – Alert Identification List” all alerts that the R5 SUPREME AIS system can generate are listed with Alert identifiers, instance identity, Priority and texts for both “Legacy Alert” and “Bridge Alert Management”.

Observe that all alerts generated by the R5 SUPREME AIS system are of “Category B” and does not support responsibility transfer functionality.

Alert ID	Instance ID	Priority	Alert Text (BAM)	Description Text (BAM)	Alert Description (Legacy Alert)
3003	165	Caution	Lost AIS	Check connection to AIS transponder	CDU Lost Connection To Transponder
3003	25	Caution	Lost ext EPFS	Check external position sensor	External EPFS lost
3003	65	Caution	Hot standby lost	Check AIS Hot standby connection	Hot standby connection failure
3008	1	Warning	Transceiver fail	Not transmitting check AIS	Tx malfunction
3008	34	Warning	Transceiver fail	Not receiving check AIS	(No Legacy)
3009	8	Caution	MKD Lost	Cannot Display safety related messages	MKD connection lost
3013	9	Caution	Doubtful GNSS	Int/Ext GNSS position mismatch	Int/Ext GNSS position mismatch
3013	11	Caution	Doubtful Heading	Difference with COG exceeds limit	Heading sensor offset
3015	26	Warning	Lost positon	Own ship position not transmitted	No sensor position in use
3019	10	Caution	Wrong NavStatus	Check NavStatus setting	NavStatus incorrect
3062	6	Warning	General fault	Check AIS equipment	General failure
3108	14	Warning	Locating device	Check AIS targets	Active AIS SART
3113	7	Caution	Sync in fallback	Check AIS for UTC time synchronization	UTC sync invalid
3116	2	Caution	Impaired radio	Reduced coverage (antenna VSWR)	Antenna VSWR exceeds limit
3116	3	Caution	Impaired radio	Ch1 inoperative check AIS	Rx channel 1 malfunction
3116	4	Caution	Impaired radio	Ch2 inoperative check AIS	Rx channel 2 malfunction
3116	5	Caution	Impaired radio	DSC inoperative	Rx channel 3 malfunction
3119	29	Caution	Missing SOG	Not transmitting SOG	No valid SOG information
3119	30	Caution	Missing COG	Not transmitting COG	No valid COG information



Alert ID	Instance ID	Priority	Alert Text (BAM)	Description Text (BAM)	Alert Description (Legacy Alert)
3119	32	Caution	Missing Heading	Not transmitting Heading	Heading lost/invalid
3119	35	Caution	Missing ROT	Not transmitting Rate of Turn	No valid ROT information
10072	72	Caution	Tx disabled	AIS transmitting externally disabled	TX disabled externally

Table 10 – Alert Identification List

Maximum number of alerts possible to occur: 21

Note: Active alert of priority “Warning” escalates to “Warning” every second minute if not acknowledged, while “Caution” cannot escalate.

Note: Information on when and why the alerts appear can be found in section 9.3

Note: When working with “Legacy alert” (ALR sentence) compatibility the Instance identity is the same as the “Unique Alarm Identifier”

6.20 Status List

Current status indications are listed in the *Status List* view that can be accessed from **Main Menu** → **Status** → **Status List**. The different status indications that can occur are listed in section 9.8.

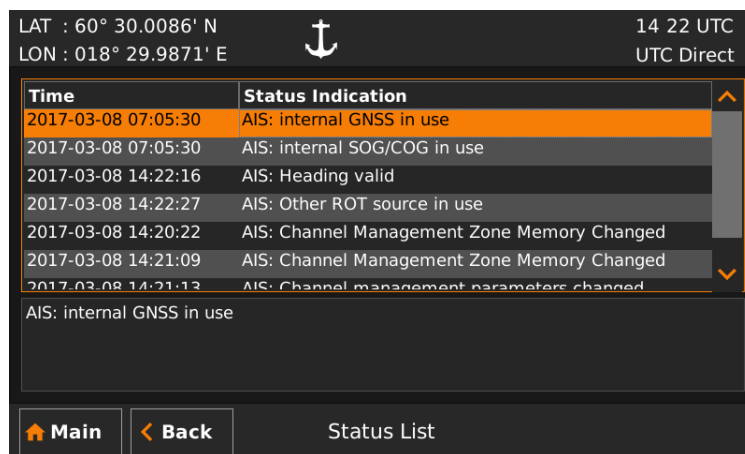


Figure 28 - Status List

6.21 Non Functional Time

This view displays information about times when the R5 SUPREME Transponder has been turned off or for some other reason has not been transmitting for more than 15 minutes. The view is accessed from **Main Menu** → **Status** → **AIS** → **Non Functional Time**.

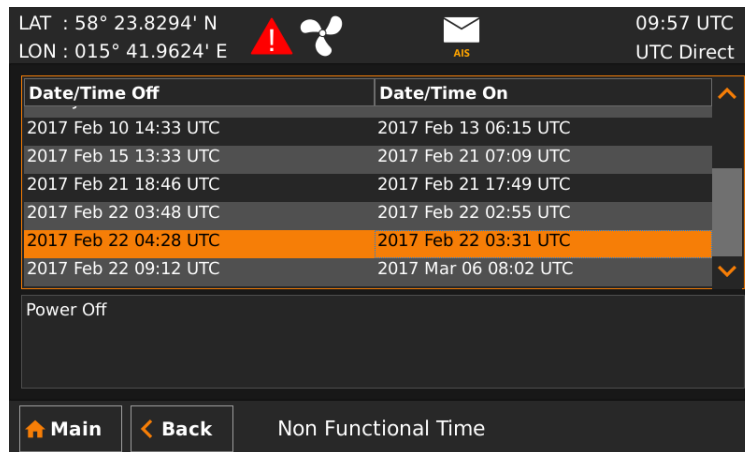


Figure 29 - Non Functional Time

6.22 AIS Internal GPS Status

This view displays the satellites received by the R5 SUPREME Transponder internal GPS receiver. The list is sorted by the satellites ID (PRN number) and shows elevation, azimuth and signal to noise ratio (SNR) for each satellite. The view also displays the total number of satellites in view, total number of satellites used in the position calculation reported by GGA sentence, current operating mode and dilution of precision (DOP) values.

To view the currently used GPS constellation, press the “Sky Plot”

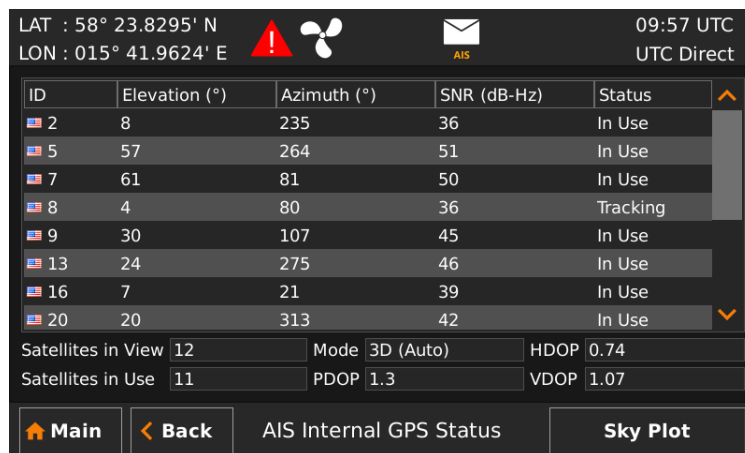


Figure 30 – AIS Internal GPS Status

6.23 Sky Plot

From the *AIS Internal GPS Status* view the *Sky Plot* view is accessible. This view shows the current GPS constellation in a plot. Each received satellite is colour coded based on status and SNR.

Depending on SNR and status, received satellites are displayed in colors according to:

- - Status *In Use* and SNR over 40 dB-Hz
- - Status *In Use* and SNR below 40 dB-Hz
- - Status *Tracking* (not used in position solution)

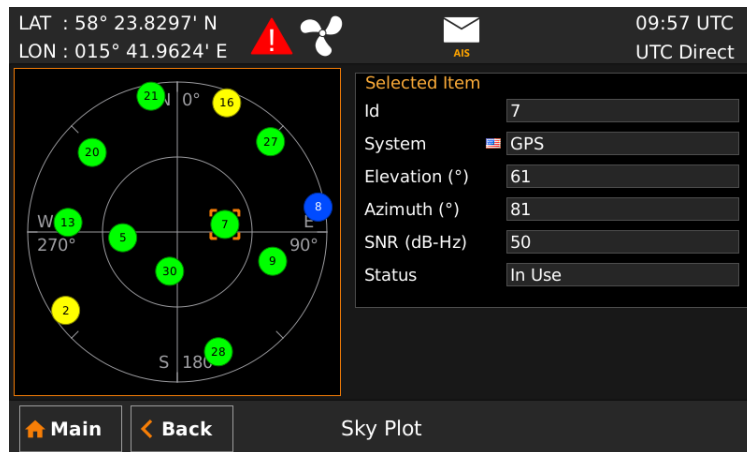


Figure 31 – Sky Plot

6.24 View Raw Data

This view displays the incoming data on the selected serial port. It is also possible to pause the data on the screen by pressing the “Pause” button. The *View Raw Data* view can be a helpful tool when trouble shooting the system to see what sensor input is actually received on each port. The view can be accessed from **Main Menu → Status → View Raw Data**.

Characters are displayed as according to ISO 8859-1 (Latin-1). Non-printable characters are displayed with symbol names as “<SYMBOL>”, e.g. carriage return and line feed are displayed as “<CR><LF>”.

Use ‘Clear View’ button to clear current log data.

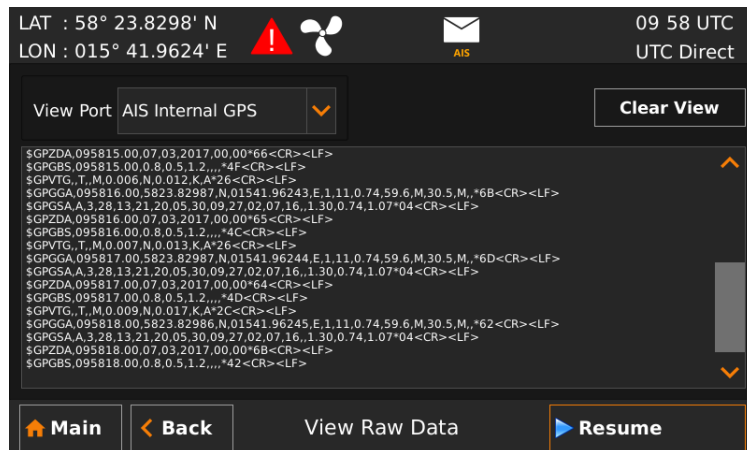


Figure 32 - View Raw Data

6.25 SW/HW Info

This view displays the software and hardware revisions for the R5 SUPREME AIS System and is accessed from **Main Menu → Status → SW/HW Info**. This information should always be provided when in contact with Saab TransponderTech support.

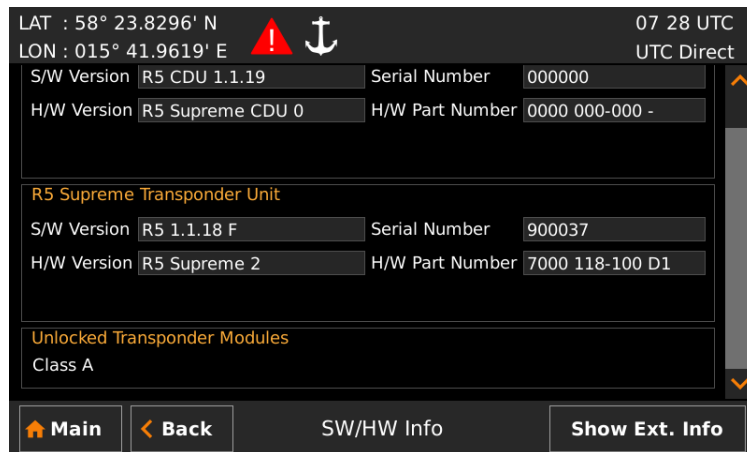


Figure 33 - SW/HW Info

6.26 VHF Status

The *VHF Status* view shows the currently used settings. The view can be accessed from **Main Menu → Status → AIS → VHF Status**. Channel number, frequency, power and operation mode are displayed for each VHF transceiver in the R5 SUPREME Transponder. This information is useful when troubleshooting to make sure that the R5 SUPREME Transponder uses the expected VHF radio settings. If e.g. a regional area is set and in use, this will affect the information shown in the VHF Status view.

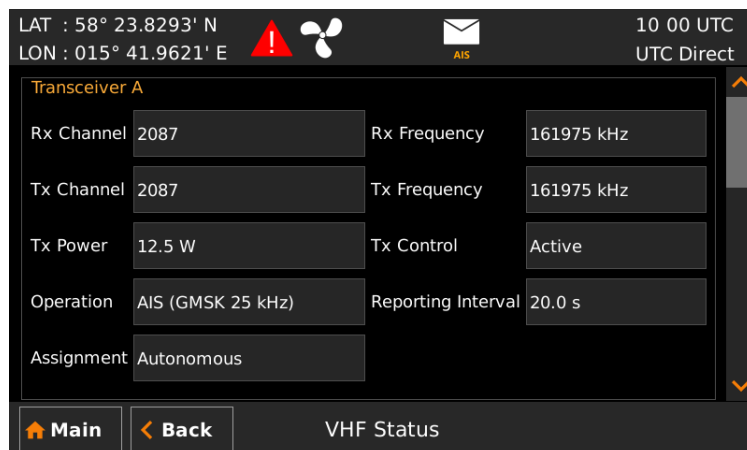


Figure 34 - VHF Status

6.27 Hot Standby Status

This view shows current status of the hot standby operation described in section 4.13. It can be accessed from **Main Menu → Status → AIS → Hot Standby Status**.

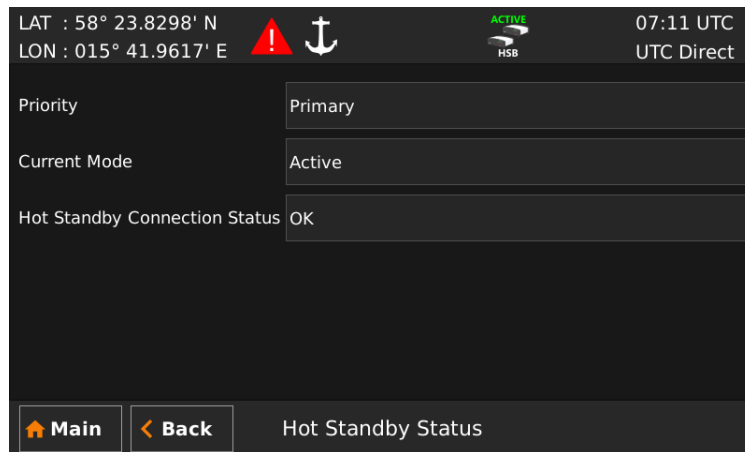


Figure 35 – Hot Standby Status

The view shows if the transponder is configured as Primary or Secondary unit in the hot standby pair, current mode (“Active” or “Standby”) and also status of the hot standby operation. The status can be one of the following:

- **OK** – Hot Standby is working properly.
- **Lost connection to other unit** – Serial connection between the two transponders is not working.
- **One way communication** – Status from this unit does not reach the other unit.
- **Configuration mismatch** – Primary/Secondary configuration wrong. One unit must be set to “Primary” and the other to “Secondary” for the Hot Standby pair to work.
- **Hot standby version mismatch** – The transponders in the Hot Standby pair have different software versions.
- **Product mismatch** – The transponders in the Hot Standby pair have different product licenses.

If the hot standby connection status is anything else the “OK” an alert will also be generated. The hot standby alert is configurable as described in section 5.3.15.

6.28 Communication Test

When installing the R5 SUPREME AIS System, or when performing annual testing, a communication test shall be done to ensure that other transponder systems can receive the R5 SUPREME Transponder’s transmissions. This can be done from the *Communication Test* view accessed from **Main Menu → Maintenance → Functional Test → Communication Test**.

When entering the *Communication Test* view a suggested target with a suitable range (between 15 NM and 25 NM) will be selected in the MMSI parameter field if such a target has been received by the R5 SUPREME AIS System. It is however possible to select a different target for the communication test. To start the test, click on the “Send” button in lower right corner. A popup with the result of the communication test will appear if a reply is received or if no reply has been received within 15 seconds.

Result will be cleared within 30 seconds of a successful or failed test.

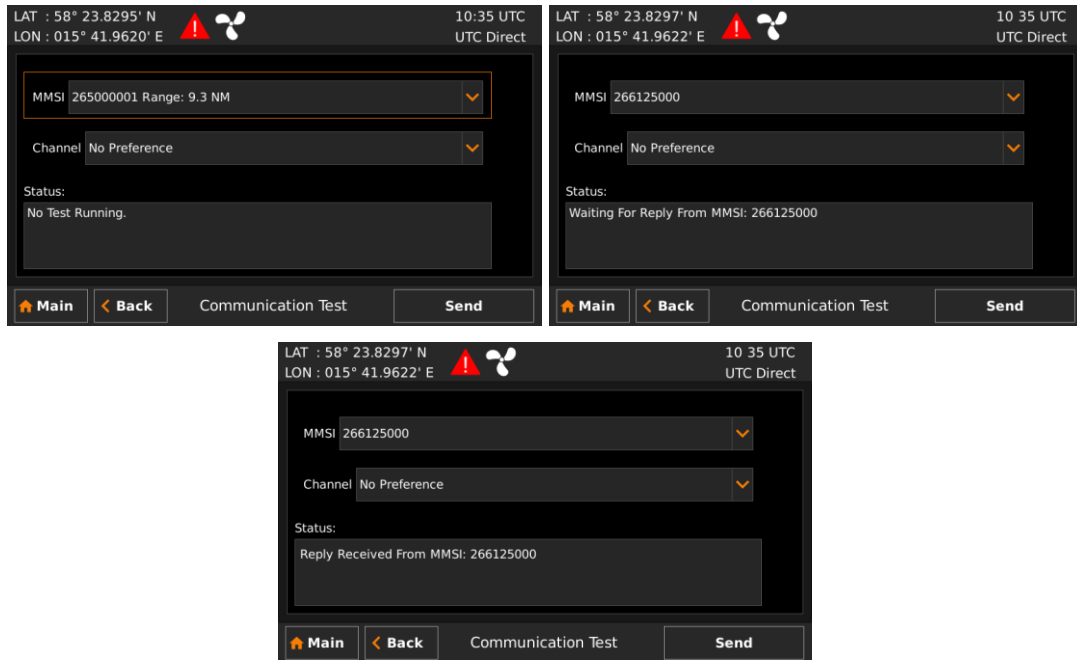


Figure 36 - Communication Test

6.29 Update Software

The software of the R5 SUPREME CDU is easy upgradable via the USB Host interface located behind the front hatch of the R5 SUPREME CDU. To perform a software update, follow the instructions in the *Update Software* view that can be accessed from **Main Menu** → **Maintenance** → **System Update** → **Update CDU SW**. For more information about the upgrade procedure, refer to chapter 7, “Software Upgrade”.

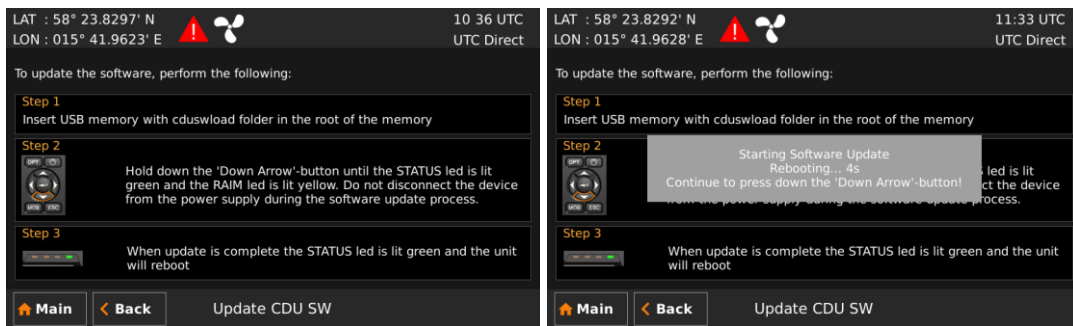


Figure 37 - Update Software

6.30 Factory reset

All config parameters described in section 5.3 “Configuration Parameters” can be set to default values from the *Factory Reset* view which can be accessed from **Main Menu** → **Maintenance** → **Factory reset**.

NOTE 1: All SRM, Long Range and text messages will be deleted from the system!

NOTE 2: The MMSI parameter will also be reset to zero and therefore the transponder will stop transmitting and the alert “Transceiver fail” will become active.

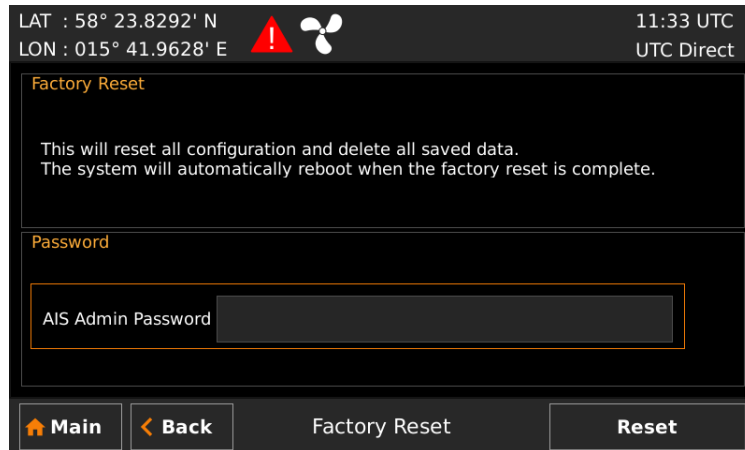


Figure 38 – Factory Reset

6.31 Save/Load Config to/from USB memory

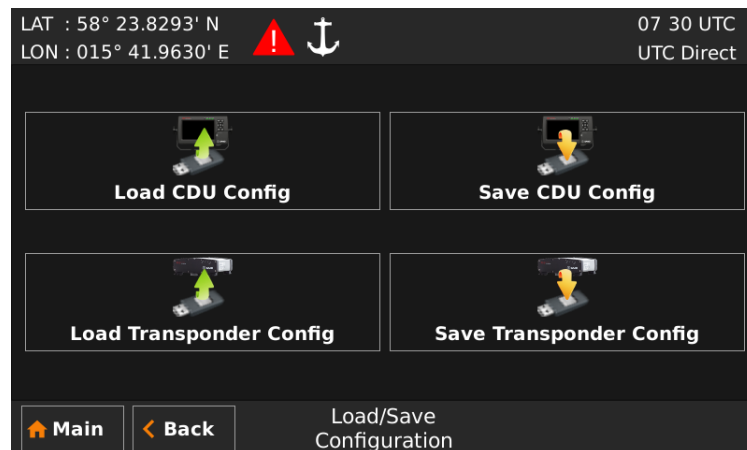


Figure 39 – Load/Save Configuration Menu

The R5 SUPREME AIS Transponder System has the capability to save configuration of both CDU and transponder to a USB memory. The configuration files can be used as backup so that the SUPREME system can be restored to a previous configuration; however during normal software upgrade of the SUPREME AIS system the configuration parameters will NOT be changed so a backup is usually not needed.

The saved configuration files can also be used to load several R5 SUPREME systems with the same settings.

The CDU configuration file includes all settings that can be found under the *Display Configuration* view (**Main Menu → Maintenance → Configuration → Display**) as well as CDU interface settings such as IP address, SFI and System Setup. The transponder configuration file includes all other settings such as Alert configuration, Interface settings, Ship Static, Ship Dimensions, Voyage settings etc.

The following sections describe how to save/load CDU and transponder configuration to/from USB memory. The load/save configuration views can be accessed from **Main Menu → Maintenance → System Update → Load/Save Configuration**.

6.31.1 Save CDU configuration to USB memory

Do the following to save the CDU configuration to a file on a USB memory.

1. Insert a FAT32 formatted USB memory in the USB host interface port in the R5 CDU.



2. Enter the *Save CDU Config to USB* view.

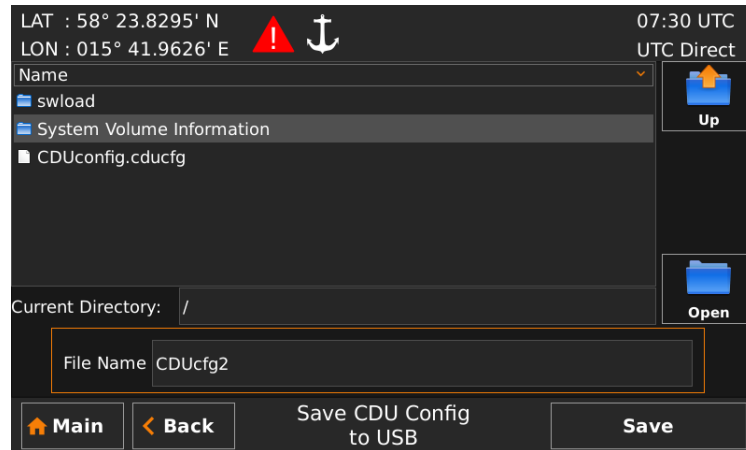


Figure 40 – Save CDU Config to USB

1. Open the folder on the USB memory where the CDU configuration file should be saved. The file will be saved in the folder shown in the “Current Directory” field.

Use the touch interface or the arrow keypad to navigate between folders and files on the USB memory. Only folders and CDU configuration files will be listed in the view. To view the contents of a sub folder, mark the folder in the list and press the button “Open” using the touch interface, or use the arrow keypad and press ENTER. To go back to the previous folder, use the touch interface or the arrow keypad to press the “Up” button in upper right corner of the view.

2. Select an existing CDU configuration file to overwrite it or enter a new file name by pressing the “File Name” edit field.
3. Press “Save” to save the CDU configuration to the specified file and directory.
4. A popup will appear stating how many parameters that have been saved in the file on the USB memory.

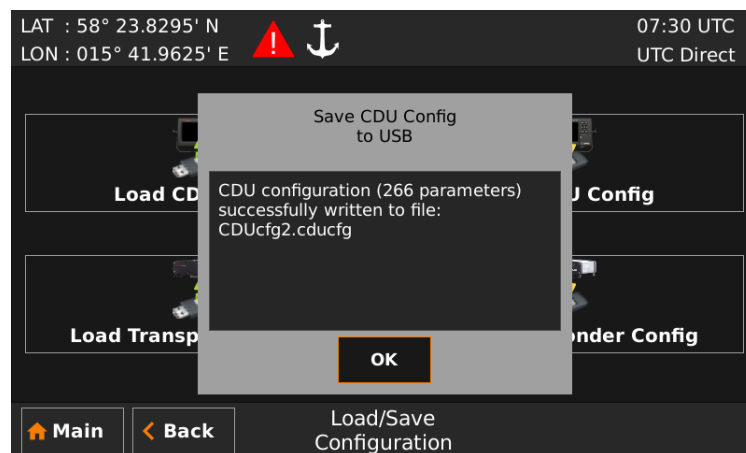


Figure 41 – CDU Config successfully saved

6.31.2 Load CDU configuration from USB memory

Do the following to load the CDU configuration from an existing config file on a USB memory:

1. Insert the USB memory in the USB host interface port in the R5 CDU.
2. Enter the *Load CDU Config from USB* view.

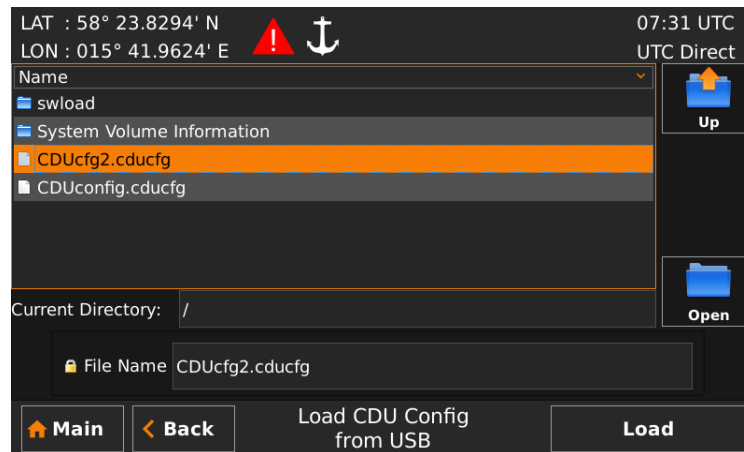


Figure 42 – Load CDU Config from USB

3. Select the desired configuration file.
Use the touch interface or the arrow keypad to navigate between folders and files on the USB memory. Only folders and CDU configuration files will be listed in the view. To view the contents of a sub folder, mark the folder in the list and press the button “Open” using the touch interface, or use the arrow keypad and press ENTER. To go back to the previous folder, use the touch interface or the arrow keypad to press the “Up” button in upper right corner of the view.
4. Press “Load” to load configuration from the selected file. A virtual keyboard prompting for the CDU password will appear. Enter the password (default = “cdupwd”) and press ENTER on the virtual keyboard.
5. A popup will appear stating how many parameters that have been loaded. If the System Type parameter has been changed the CDU will reboot.

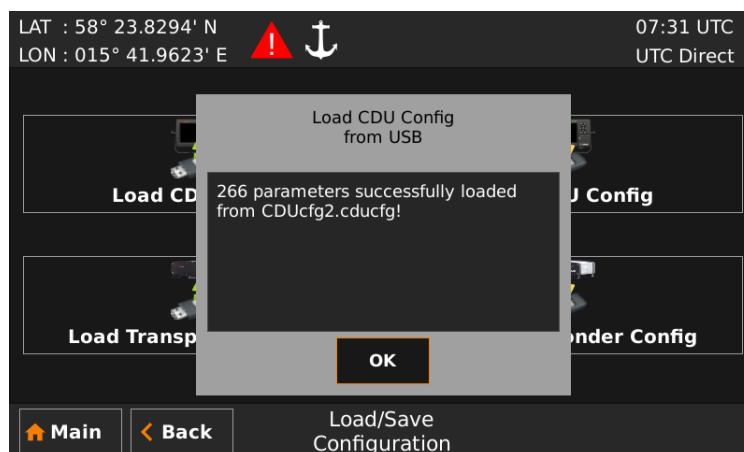


Figure 43 – CDU Config successfully loaded

6.32 Save Transponder configuration to USB memory

Do the following to save the transponder configuration to a file on a USB memory.

1. Insert a FAT32 formatted USB memory in the USB host interface port in the R5 CDU.
2. Enter the *Save Transponder Config to USB* view.

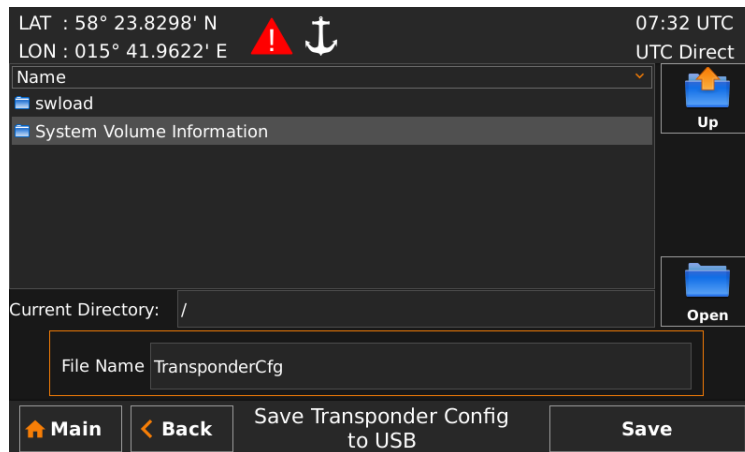


Figure 44 – Save Transponder Config to USB

3. Open the folder on the USB memory where the transponder configuration file should be saved. The file will be saved in the folder shown in the “Current Directory” field.
Use the touch interface or the arrow keypad to navigate between folders and files on the USB memory. Only folders and transponder configuration files will be listed in the view. To view the contents of a sub folder, mark the folder in the list and press the button “Open” using the touch interface, or use the arrow keypad and press ENTER. To go back to the previous folder, use the touch interface or the arrow keypad to press the “Up” button in upper right corner of the view.
4. Select an existing transponder configuration file to overwrite it or enter a new file name by pressing the “File Name” edit field.
5. Press “Save” to save the transponder configuration to the specified file and directory.
6. A popup will appear when the configuration has been read from the transponder and written to the USB memory.

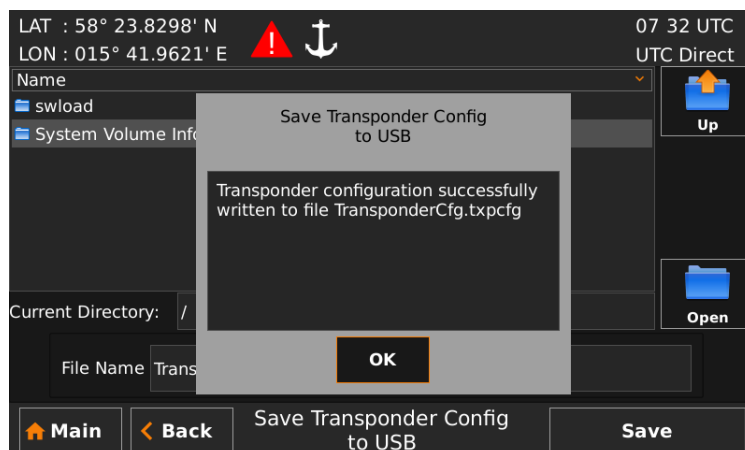


Figure 45 – Transponder Config successfully saved

6.32.1 Load Transponder configuration from USB memory

Do the following to load the transponder configuration from an existing config file on a USB memory:

1. Insert the USB memory in the USB host interface port in the R5 CDU.
2. Enter the *Load Transponder Config from USB* view.

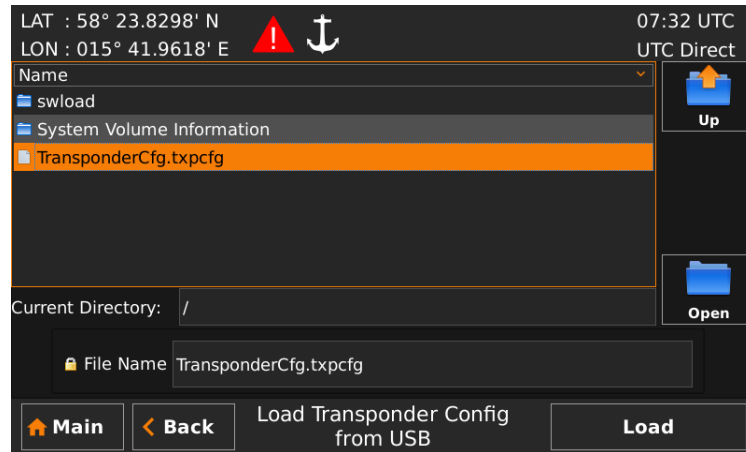


Figure 46 – Load Transponder Config from USB

3. Select the desired configuration file.

Use the touch interface or the arrow keypad to navigate between folders and files on the USB memory. Only folders and transponder configuration files will be listed in the view. To view the contents of a sub folder, mark the folder in the list and press the button “Open” using the touch interface, or use the arrow keypad and press ENTER. To go back to the previous folder, use the touch interface or the arrow keypad to press the “Up” button in upper right corner of the view.

4. Press “Load” to load configuration from the selected file. A virtual keyboard prompting for the admin password will appear. Enter the password (default = “admin”) and press ENTER on the virtual keyboard.
5. A popup will appear stating how many parameters that have been successfully loaded in the transponder.

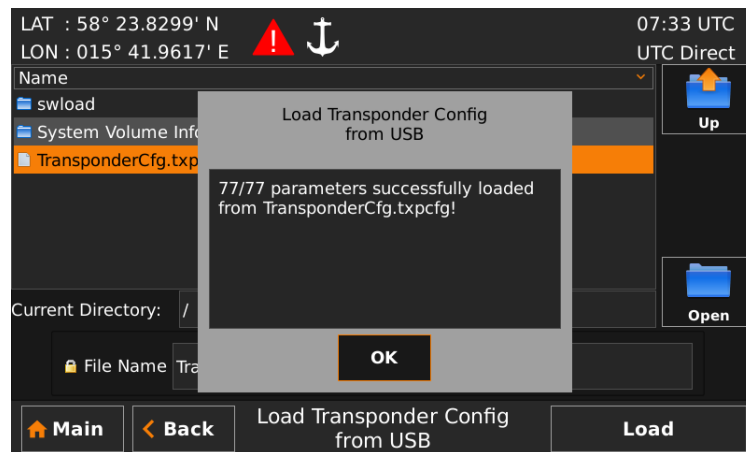


Figure 47 – Transponder Config successfully loaded.



7 SOFTWARE UPGRADE

Note: After updating the software add a sticker stating the new software version close to the product label.

After replacing the CDU or Transponder unit with a new unit, it may be necessary to make a software upgrade to make sure there are no software compatibility issues.

It is possible to upgrade the software in the Transponder unit and the CDU unit. Make sure to carefully read the release notes for the software upgrade package first.

The Transponder can be upgraded over Ethernet via the R5 CDU USB port or from the R5 AIS Junction box USB port.

7.1 Upgrade Software in R5 SUPREME Transponder via Junction Box.

The R5 SUPREME Transponder can be upgraded through the USB host interface located in the R5 AIS Junction Box. To upgrade the software in the R5 SUPREME Transponder, perform the following steps:

- Unzip the R5 SUPREME Transponder upgrade package in the root folder of an USB memory stick (must be FAT32 formatted). There should now be a folder called swload in the USB root folder.
- Insert the USB memory stick in the USB host interface in the R5 AIS Junction Box. It is accessible when the lid of the junction box has been removed.
- Make sure that the R5 SUPREME Transponder's 26-pin **I/O** port is connected to the R5 Junction Box.
- Hold down the 'SW-LOAD'-button in the R5 AIS Junction Box. The R5 SUPREME Transponder will reboot and start the software upgrade. The 'SW-LOAD'-button must be held down until the transponder **STATUS LED** is lit green and the transponder **Rx LED** is lit yellow.

The software upgrade is complete when the **STATUS LED** is lit green, this normally takes a couple of minutes. The R5 SUPREME Transponder will automatically reboot after 3 seconds.

*NOTE: If the upgrade process fails, The **STATUS LED** will be lit red and one of the **Rx LED** or **Tx LED** starts blinking; see Table 11 for reason of failure. Should this happen, trouble shoot according to error code. Hold down the 'SW-LOAD'-button and reboot the R5 SUPREME to try again.*

	STATUS	Rx	Tx
Upgrade mode started	GREEN	YELLOW	
Upgrade in progress		Blinking YELLOW	
Upgrade complete (automatic reboot after 3 sec)	GREEN		
Error: USB Not Found	RED	Blinking YELLOW 0.5Hz	



	STATUS	Rx	Tx
Error: No SW found on USB	RED	Blinking YELLOW 4Hz	
Error: Flash erase failed	RED		Blinking RED 0.5 Hz
Error: Flash write failed	RED		Blinking RED 4 Hz

Table 11 – LED Indicators during Software Upgrade

Troubleshooting:

Error: No USB Found – Try a different make or model of USB memory. Format as FAT32.

Error: No SW found on USB – Verify SW folder structure on USB memory.

7.2 Upgrade Software in R5 SUPREME Transponder via CDU

It is also possible to upgrade the R5 SUPREME Transponder via Ethernet interface by using the R5 SUPREME CDU. Perform the following steps to initiate the transponder software upgrade from the R5 SUPREME CDU:

- Unzip the R5 SUPREME Transponder upgrade package in the root folder of an USB memory stick (must be FAT32 formatted). There should now be a folder called swload in the USB root folder.
- Insert the USB memory stick in the USB host interface in the USB port located behind the front hatch of the R5 SUPREME CDU.
- Make sure that the R5 SUPREME CDU and R5 SUPREME Transponder communicates with each other via Ethernet. Several R5 Transponders may be available on the network. The currently selected transponder is marked with green colour in the *Select Transponder* view which can be accessed from **Main Menu → Maintenance → Configuration → Interface → Network → Select Transponder**.

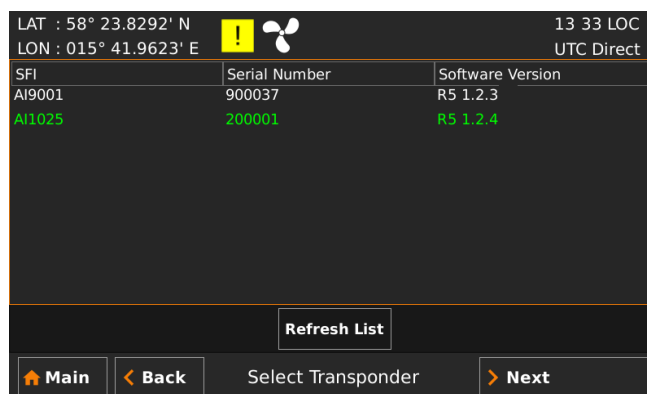


Figure 48 – Select Transponder

- Start the upgrade procedure by following the on screen instructions in the *Update Transponder SW* view that can be accessed from **Main Menu → Maintenance → System Update → Update Transponder SW**.

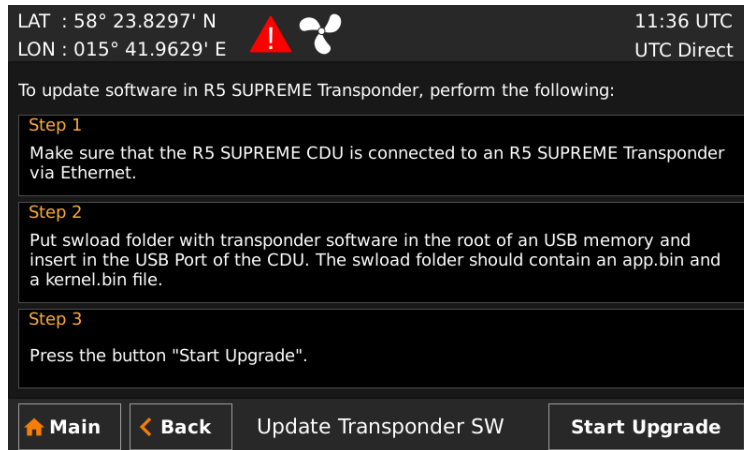


Figure 49 –Update Transponder SW

- The R5 SUPREME Transponder will reboot when the new software has been loaded so the connection will temporarily be lost. When the transponder has rebooted with the new software and connection is established again, the following view will be shown, indicating that the upgrade is complete:

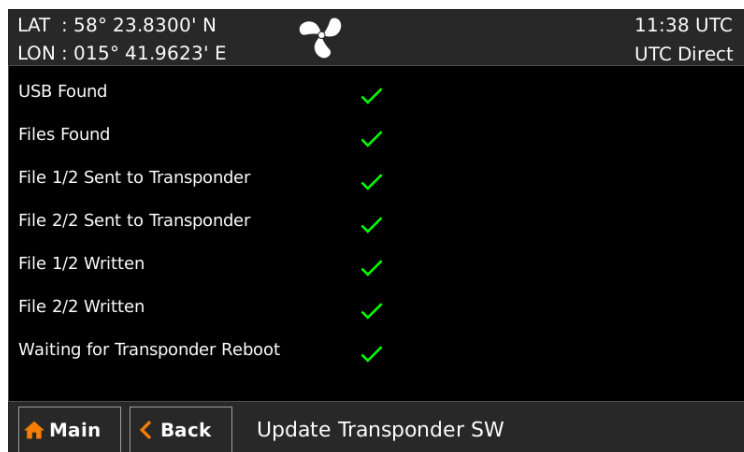


Figure 50 –Update Transponder SW, Complete

7.3 License Upgrade

Some features in the R5 SUPREME AIS System are license controlled and needs to be unlocked by a special license file. A license file is unique for each single R5 SUPREME Transponder. The license file name has the following structure:

200001 - 7000 118-611 [Secure W-AIS].lic

In this example:

200001 – The serial number of the R5 SUPREME Transponder unit this key works with.

7000 118-611 – The part number of this license key.

To upgrade the license in the R5 SUPREME AIS System, perform the following:

- Place the license file in the root of a FAT32 formatted USB memory. It is possible to put many license files on the same USB memory if upgrading several units.
- Make sure that the R5 SUPREME CDU and R5 SUPREME Transponder communicates with each other via Ethernet. Several R5 Transponders may be available on the network. The currently selected transponder is marked with green colour in the *Select Transponder*



view that can be accessed from **Main Menu → Maintenance → Configuration → Interface → Network → Select Transponder**.

- Insert the USB memory in the USB host interface located behind the front hatch of the R5 SUPREME CDU.
- Enter the view **Main Menu → Maintenance → System Update → License** and press the button “Update License”.
- If the license is successfully set, a number of unlocked modules will appear:

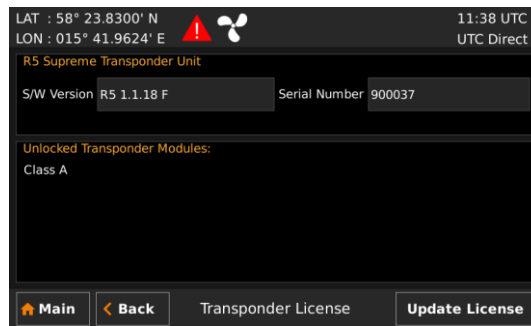


Figure 51 – License Upgrade Successful

- If a correct license file cannot be found on the USB memory, the following will appear:

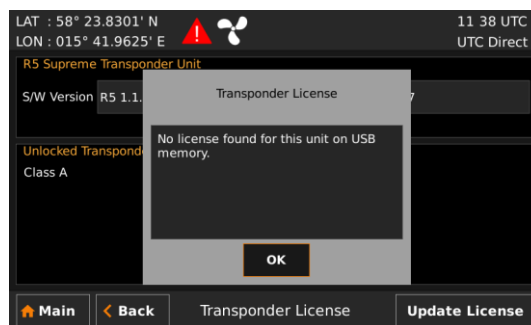



Figure 52 – No License File Found

7.4 Upgrade Software in R5 SUPREME CDU

The R5 SUPREME CDU is easy upgradable through the USB host interface located behind the front hatch. To upgrade the software in the R5 SUPREME CDU, perform the following steps:

- Unzip the R5 SUPREME CDU upgrade package in the root folder of an USB memory stick (must be FAT32 formatted). There should now be a folder called cduswload in the USB root folder.
- Insert the USB memory stick in the USB host interface located behind the front hatch.
- Navigate to the *Update CDU SW* view that can be accessed from **Main Menu → Maintenance → System Update → Update CDU SW**.

-  Hold down the ‘Down Arrow’-button on the front of the R5 SUPREME CDU. The CDU will reboot after a few seconds. The ‘Down Arrow’-button must be held down until the STATUS LED is lit green and the RAIM LED is lit yellow.



The software upgrade is complete when the **STATUS LED** is lit green, this normally takes a couple of minutes. The R5 SUPREME CDU will automatically reboot after 3 seconds. Check that correct SW has been loaded in the SW/HW Info view which can be accessed through **Main Menu → Status → SW/HW Info**.

If the upgrade process fails, The **STATUS LED** will be lit red and one of the **RAIM LED** or **MODE LED** starts blinking. Should this happen, hold down the power button for at least 15 seconds to reboot the system. Another attempt can now be performed. Verify content on the USB and possibly try with another brand of memory stick if the problem persists.

The software upgrade can also be initiated from any view in the R5 SUPREME CDU by rebooting the system while the 'Down Arrow'-button is held down.

	MODE LED	RAIM LED	STATUS
Upgrade mode started		YELLOW	GREEN
Upgrade in progress		Blinking YELLOW	
Upgrade complete (automatic reboot after 3 sec)			GREEN
Error: USB Not Found		Blinking YELLOW 0.5Hz	RED
Error: No SW found on USB		Blinking YELLOW 4Hz	RED
Error: Flash erase failed	Blinking RED 0.5 Hz		RED
Error: Flash write failed	Blinking RED 4 Hz		RED

Table 12 – CDU LED Indicators during Software Upgrade



8 TECHNICAL SPECIFICATIONS

8.1 R5 SUPREME Transponder

8.1.1 Physical

Dimensions:	Height: 77 mm Width: 227 mm Depth: 192 mm
Weight:	2.05 kg

8.1.2 Electrical

Input Voltage:	12-24 VDC
Power Consumption:	20 W (60 W peak)

8.1.3 Environmental

Temperature:	-15°C to +55°C (Operational) -30°C to +80°C (Storage)
Vibrations:	IEC 60945 ed. 4
EMC:	IEC 60945 ed. 4
Radio Type Approval:	IEC 61993-2 ed. 2
Compass Safe Distance:	65 cm (for standard magnetic compass) 40 cm (for steering magnetic compass)

8.1.4 VHF Transceiver

Receivers:	155 – 163 MHz (TDMA) 156.525 MHz fixed (DSC, Channel 70)
Transmitter:	155 – 163 MHz
Channel bandwidth:	25 kHz
Output Power:	High: 12.5 W Low: 1W “Tanker 1W Mode”: 1W
VHF antenna connector:	BNC-Female
Antenna Input Impedance:	50 ohm



8.1.5 Internal GPS Receiver

Type:	GPS L1, C/A Code, 50 Channels
Update rate:	2 Hz
Accuracy:	< 2.5 m (GPS, CEP, 50%, 24 hours static) < 2.0 m (SBAS, CEP, 50% 24 hours static)
Antenna feeding:	5 VDC
GPS Antenna connector:	TNC-Female
Antenna Input Impedance:	50 ohm

8.1.6 AIS Alarm Relay

Max switching current:	0.1 – 5 A
Max switching voltage:	30 VDC
Max switching power:	150 W

8.2 R5 SUPREME CDU

8.2.1 Physical

Dimensions:	Height: 140 mm Width: 255 mm Depth: 84 mm
Weight:	1.6 kg
Dimensions (incl. gimbal mount)	Height: 170 mm Width: 295 mm Depth: 84 mm
Weight (incl. gimbal mount):	1.8 kg

8.2.2 Electrical

Input Voltage:	12-24 VDC
Power Consumption:	13 W

8.2.3 Environmental

Temperature:	-15°C to +55°C (Operational) -30°C to +80°C (Storage)
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Vibrations and EMC:	IEC 60945 ed. 4
Compass Safe Distance:	75 cm (for standard magnetic compass) 50 cm (for steering magnetic compass)

8.1 R5 AIS Junction Box

8.1.1 Physical

Dimensions:	Height: 72 mm Width: 272 mm Depth: 195 mm
Weight:	0.75 kg

8.1.2 R5 AIS Junction Box Alarm Relay

Max switching current:	2 A
Max switching voltage s:	220 VDC or 250 VAC
Max switching power:	60W (DC) or 62.5 VA (AC) resistive load



9 TROUBLESHOOTING

One of the basic ideas with troubleshooting is to solve a supposed problem on site instead of immediately sending the suspected part for a costly repair. Solving a supposed problem would in this aspect mean both to rectify the real problem, but it could also mean that the suspected part is confirmed to be working or not-working.

Historically, many of the parts sent to Saab TransponderTech for repair have in fact been confirmed working instead. Another common scenario is that the equipment has faulty I/O settings or other erroneous configurations, easy to fix on site. A proper troubleshooting would ideally prevent those unnecessary returns of fully functional equipment.

There are numerous ways to troubleshoot a transponder installation, much dependant on the skill and experience level of the troubleshooter. The preferred approach may probably also differ between different individuals, and there is no such thing as right or wrong.

This chapter is not intended to be a step by step troubleshooting instruction, but instead offer a toolbox with some different techniques on how to troubleshoot the R5 SUPREME AIS System.

9.1 Troubleshooting Prerequisites

A transponders operating environment may naturally differ widely, ranging from small high-speed RIB's to very large SOLAS tankers, military aircraft carriers and even submarines. The diversity of installation environments will of course have impact on the complexity of the troubleshooting, but it is always advisable to start with minimizing all possible interference sources in order to simplify the troubleshooting.

- Disconnect other NMEA equipment from the R5 (ECDIS, RADAR, NAV, etc.)
- Switch off other emission sources (RADAR, SATCOM, VHF, etc.)

We strongly encourage to always use the latest software available for the R5 SUPREME System. It may contain bug-fixes and other improvements solving already known issues. Always check existing release notes to see if your problem is to be found.

9.2 Troubleshooting with the Front Panel LED's of the Transponder

It is very fast and effective to use the LED's to verify the status of the R5 SUPREME Transponder. This should always be the first step in the troubleshooting.

9.2.1 STATUS LED (multi-colored)

- The STATUS LED is constantly lit green when the transponder is operating and no alerts are active.
- The STATUS LED is constantly lit red if there are one or more active alerts in the transponder, but no unacknowledged alerts. Refer to chapter 9.3 for interpretation of the alerts.
- The STATUS LED is flashing red if there are one or more unacknowledged alerts in the transponder. Refer to chapter 9.3 for interpretation of the alerts.

If neither colour are lit, nor flashing, then check the power supply and make sure that:

- The voltage is correct and stable
- The polarity is correct and not switched
- The available current is sufficient for start up and transmission
- The external fuse is functional



- The power cable is undamaged
- The power connector is properly connected and secured

9.2.2 RX LED (yellow)

The RX LED is flashing yellow when the transponder is receiving a message from the VDL. This can be intermittently.

If there is verified traffic on the VDL and the RX LED still is dark, then check the alert list for any active alerts. Refer to chapter 9.3 for interpretation of the alerts.

Lack of reception may be an indication of a VHF antenna problem or connectivity issues. Check the installation for problems.

9.2.3 TX LED (red)

The TX LED is flashing red when the transponder is transmitting a message to the VDL. The transmission interval is between 2 – 360 seconds. Refer to chapter 9.5.

If the TX LED is completely dark, then check so that the transmission is not switched off either through an active regional area or by the Tx Mode parameter. It is possible to check the status on each transceiver in the VHF Status view described in section 6.26.

If the transmission is activated and there still is no red flashing, then check the alert list for any active alerts. Refer to chapter 9.3 for interpretation of the alerts.

9.3 Troubleshooting with Alert Messages

The R5 SUPREME AIS System constantly monitors itself for failures, abnormal conditions and other important parameters. Some of the monitoring trigger alerts and those alerts are excellent aids in the troubleshooting process.

An active alert can have three states, silenced, unacknowledged and acknowledged. The state of an alert will affect the STATUS LED on both the R5 SUPREME Transponder and the R5 SUPREME CDU. Refer to chapter 9.2.1.

All active alerts are output on all the serial interface ports of the R5 SUPREME Transponder every 30 seconds. The alert status can for example be used in interfacing ECDIS systems or centralized alert systems. The alerts can also be monitored or recorded for troubleshooting purposes by for example a terminal application.

The alerts that can occur in the R5 SUPREME AIS System are listed below:

9.3.1 Transceiver fail (Alert Identifier: 3008 Instance: 001)

9.3.2 Transceiver fail (Alert Identifier: 3008 Instance: 034)

These alerts are generated if there is a malfunction in the radio transmitter hardware or if the antenna VSWR exceeds an allowed ratio. If the radio transmitter returns to normal operation or if VSWR returns to a value below the allowed threshold, the alert is cleared. The Transceiver fail alert is also generated when the MMSI is configured to "0", in which case the R5 SUPREME Transponder will not transmit.

The transponder will automatically shutdown any transmission with a duration that exceeds two seconds. This will also result in a Transceiver fail alert. The shutdown procedure is independent of software control and will remain activated until a power cycle of the transponder.



9.3.3 Impaired radio (Alert Identifier: 3116 Instance: 002)

The VSWR (Voltage Standing Wave Ratio) of the antenna is checked for every transmission and if it exceeds a given ratio, this alert is generated. If the VSWR goes below the allowed threshold, the alert is cleared. The VSWR threshold for this alert is lower than for the Transceiver fail alert.

9.3.4 Impaired radio (Alert Identifier: 3116 Instance: 003-005)

The radio receivers are continuously monitored and if any part of the receivers' hardware should malfunction, an Rx Malfunction alert is generated for that receiver. If the radio receiver returns to normal operation, the alert is cleared.

9.3.5 General Fault (Alert Identifier: 3062 Instance: 006)

This alert is generated if the R5 SUPREME Transponder fails to initiate the radio or if a severe hardware failure has occurred. If this alert occurs, contact your retailer.

9.3.6 Sync In Fallback (Alert Identifier: 3113 Instance: 007)

This alert is generated when the R5 SUPREME Transponder loses UTC direct synchronization (cannot synchronize from internal GPS receiver).

9.3.7 Lost MKD (Alert Identifier: 3009 Instance: 008)

This alert is active if the R5 SUPREME Transponder has lost connection with the R5 SUPREME CDU. If this alert occurs, check the Ethernet connection and the network settings.

9.3.8 Doubtful GNSS (Alert Identifier: 3013 Instance: 009)

This alert is generated if the difference between the internal and external GNSS position is more than 100 m for more than 15 minutes.

9.3.9 Wrong NavStatus (Alert Identifier: 3019 Instance: 010)

This alert is generated if the navigational status is incorrect. If e.g. the navigational status is set to "At Anchor" but the ship is moving faster than 3 knots, the NavStatus incorrect alert will become active.

A popup will appear when the "Incorrect NavStatus" alert is acknowledged to prompt user to change the NavStatus.

9.3.10 Doubtful heading (Alert Identifier: 3013 Instance: 011)

This alert is active when SOG (Speed Over Ground) is greater than 5 kn and the difference between COG (Course Over Ground) and HDT (True Heading) is greater than 45° for 5 min.

9.3.11 Locating device (Alert Identifier: 3108 Instance: 014)

This alert is generated when the R5 SUPREME Transponder has received an active Locating Device position report.

9.3.12 Lost ext EPFS (Alert Identifier: 3003 Instance: 025)

This alert is generated if the position from the external Electronic Position Fixing System is invalid (i.e. no external GNSS). Due to the fallback arrangement for the positioning sensor this alert can be inactive up to 30 seconds (during which the internal GNSS is used) before the alert is deactivated.

9.3.13 Lost Position (Alert Identifier: 3015 Instance: 026)

This alert is active if the R5 SUPREME Transponder does not have a valid position (latitude/longitude) from any sensor.



9.3.14 Missing SOG (Alert Identifier: 3119 Instance: 029)

9.3.15 Missing COG (Alert Identifier: 3119 Instance: 030)

These alerts are active if the R5 SUPREME Transponder does not have a valid SOG (Speed Over Ground) or a valid COG (Course Over Ground) from any sensor. The SOG and COG is based on the speed log (if external GNSS is used and a valid heading is available) or the GNSS currently in use.

9.3.16 Missing Heading (Alert Identifier: 3119 Instance: 032)

This alert is generated if either the heading information is lost/invalid (from external sensors) or if the heading is undefined.

9.3.17 Missing ROT (Alert Identifier: 3119 Instance: 035)

This alert is active if ROT (Rate Of Turn) is undefined or if no valid ROT information is available from external sensor or internal calculations.

9.3.18 Hot Standby lost (Alert Identifier: 3119 Instance: 065)

This alert is active if hot standby functionality is enabled and there is a problem with the connection to the other transponder unit in the hot standby pair. More details about the connection problem can be found in the *Hot Standby Status* view. See sections 4.13 and 6.27 for more information about the hot standby functionality in the R5 SUPREME transponder system.

9.3.19 Lost AIS (Alert Identifier: 3002 Instance: 165)

This alert is active if the R5 SUPREME CDU has lost connection with the R5 SUPREME Transponder. If this alert occurs, check the Ethernet connection and the network settings.

9.3.1 Tx disabled (Alert Identifier: 10072 Instance: 072)

This alert is active when an external silent switch is used and the switch has disabled transmissions.

9.4 Troubleshooting via the CDU

There is a lot of information and data accessible via the CDU that can be useful for troubleshooting, and that can help finding a presumed problem. The following items are just a few examples of what to look at.

9.4.1 Transmitted Own Ship Data View

When the transponder transmits data on the VDL, it also simultaneously outputs this data on all the serial ports. This information is displayed in the *Own Ship Data* view.



LAT : 60° 30.0784' N
LON : 018° 29.9145' E
07:49 UTC
UTC Direct

Own Ship Identification
MMSI 266000237 Name R5 SUPREME Callsign R5

Dynamic Data (1/2)
ROT 1 °/min (right) Latitude 60° 30.0770' N
COG 335.0 ° Longitude 018° 29.9159' E
SOG 5.6 kn Quality Position < 10m
HDG 336 ° Sensor GPS

Next Page

Main Back Transmitted Own Ship Data

Figure 53 – Transmitted Own Ship Data

9.4.2 Target List

The target list is primarily useful when analyzing the receiving functionality. The propagation characteristics of VHF radio frequencies are close to line of sight. A harsh radio environment, reflections in cables, connectors or the antenna will shorten the effective range.

LAT : 58° 30.0000' N
LON : 018° 30.0000' E
09 23 UTC
UTC Direct

Number of Targets: 422

Ship ID	Bearing	Range	Age
UNIMAR	165.7 °	18.0 NM	00:12
VOLGO-BALT 204	45.7 °	20.8 NM	00:34
WISBY VERITY	292.0 °	21.5 NM	00:01
MMSI: 245306000	51.8 °	23.6 NM	00:23
BS: 002655090	107.7 °	24.2 NM	00:01
PILOT 111 SE	306.9 °	24.7 NM	00:19
PILOT 358 SE	306.8 °	24.7 NM	00:07
AGNES	246.3 °	25.5 NM	00:24
TRYGG	347.5 °	26.8 NM	00:00

Main Back AIS Target List Extended Info

Figure 54 – Target List

9.4.3 Time in Status Bar

The time (UTC or LOC) in the upper right corner of the display is provided by the transponder. If the time is not correct, the transponder’s internal GPS does not have a position fix. This will also be indicated by the alert “UTC sync invalid”. This problem is normally caused by a GPS-antenna failure or damaged antenna cables. This problem may also be caused by interference from radio equipment on-board.

9.4.4 View Raw Data

The *View Raw Data* view can be used to see received data on the ports of the R5 SUPREME AIS System. It is useful for troubleshooting to make sure that connected sensors provide correct data to the system. The “View Port” parameter determines from which port the data displayed in the view are taken. It is possible to pause the view by pressing the “Pause” button. All data that is received while the view is paused will not be displayed in the view.

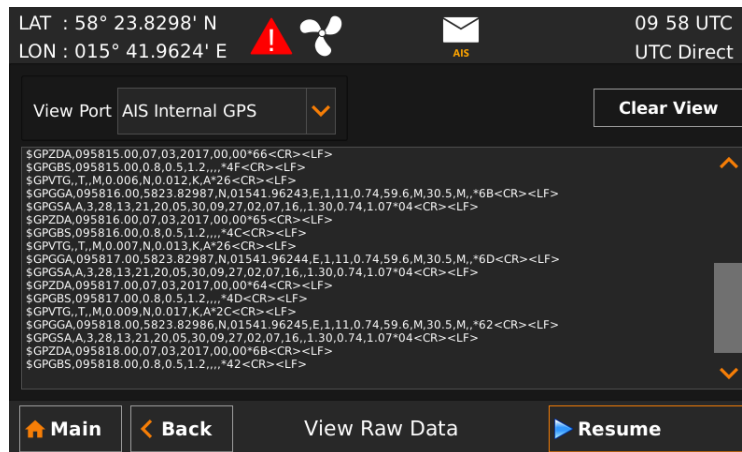


Figure 55 – View Raw Data

9.4.5 Status List

The status list view is used to display status indications that are stored in the transponder. The indications are created when an important event has occurred in the transponder. Time of occurrence and status indication text are shown in the view. A list of all possible indications can be found in section 9.8 “Indication Messages”.

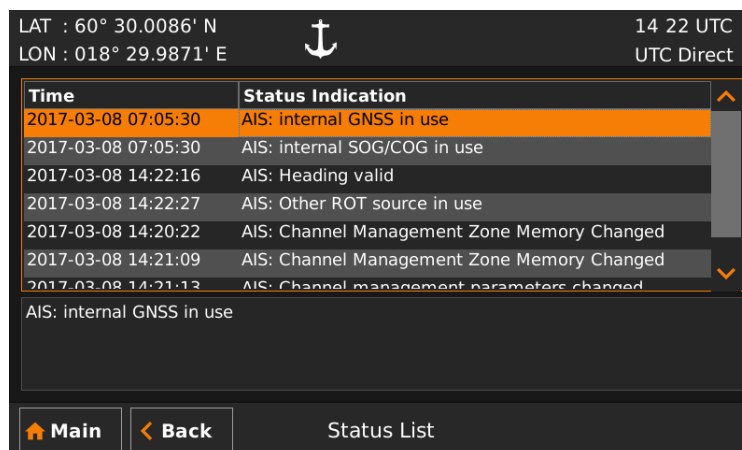


Figure 56 – Status List

9.4.6 IEC 61162-450 Counters

The *IEC 61162-450 Counters* view is accessed through **Main Menu → Maintenance → Functional Test → IEC61162-450 Counters**. It displays the rate of received and used datagrams per second and counters for the amount of different issues detected on received datagrams since start up, such as:

- Invalid header according to the IEC 61162-450 standard
- Framing issues (missing TAG starters/enders etc.)
- TAG-blocks longer than 80 characters (Length)
- TAG-blocks with unexpected/invalid characters (Syntax)
- TAG-blocks with missing sources, out of range values or sequence error (Format)
- TAG-blocks with mismatching checksum
- Sentences longer than 80 characters (Length)



- Sentences with unexpected/invalid characters (Syntax)
- Sentences with mismatching checksum

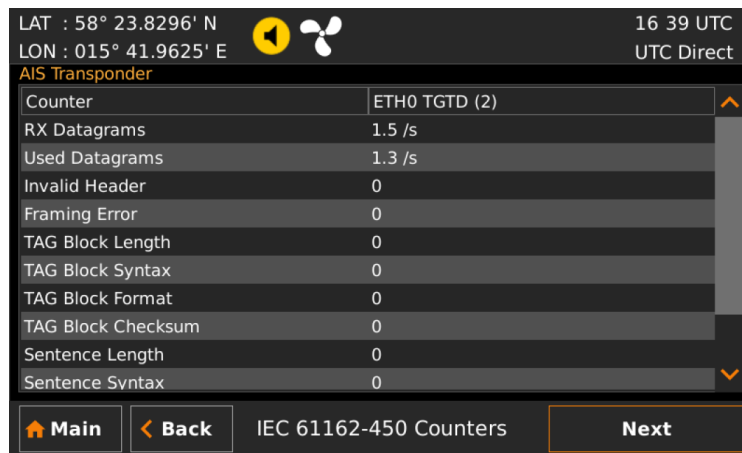


Figure 57 – IEC 61162-450 Counters

9.5 Reporting Intervals for Class A Transponders

The different information types sent by the R5 SUPREME AIS System are valid for different time periods and therefore they need different update intervals. These update intervals are defined in the AIS standard (ITU-R M 1371-5) and should be applied by all transponders. There are however some exceptions from this, which can be found in the standard. Class B transponders have for example different intervals than the Class A transponder.

All this needs to be taken in consideration while troubleshooting since it affects the anticipated behaviour of transponders.

Information type / Condition	Nominal reporting interval
Static Information	6 min, on amendment, on request
Voyage related information	6 min, on amendment, on request
Dynamic information (See conditions below)	
- Ship at anchor or moored and not moving faster than 3 knots	3 minutes
- Ship at anchor or moored and moving faster than 3 knots	10 seconds
- Ship 0-14 knots	10 seconds
- Ship 0-14 knots and changing course	3 1/3 seconds
- Ship 14-23 knots	6 seconds
- Ship 14-23 knots and changing course	2 seconds
- Ship > 23 knots	2 seconds
- Ship > 23 knots and changing course	2 seconds

Table 13 – Reporting Intervals



9.6 F.A.Q

9.6.1 I cannot see the vessel on the Internet AIS service

Websites providing AIS services like e.g. www.marinetraffic.com does not cover all the seas of the world, but only specific coastal areas where AIS receivers have been installed and that upload the data to the websites. The vessel must be in reception range of these AIS receivers to show up on the Internet AIS service.

9.6.2 I can “see” the other vessel, but they do not “see” my vessel

There are several reasons why this might happen. The first thing to check is if the R5 SUPREME Transponder is transmitting at all or if is transmitting in low power mode. In *VHF Status* view described in section 6.26 it is possible to check the status on all R5 SUPREME Transponder’s VHF transceivers. Make sure that correct channels and power mode are used. There might be a regional area set in the transponder that changes the operating mode of the R5 SUPREME Transponder. Regional areas are listed in the *Regional Area* view (see section 6.17).

The MMSI must also be configured in order for the R5 SUPREME Transponder to transmit. If the MMSI is zero, the R5 SUPREME Transponder will be silent.

Another possibility is that the other vessels’ transponder requires a shorter reception range in order to receive the R5 SUPREME Transponder’s transmissions. In the *Target List* view and the *Plot* view it is possible to see the range and bearing to other vessels.

9.6.3 The VHF range seems to be short

As a rule of thumb, the VHF range is equal to line of sight from the antenna position, which means that the higher the antenna is installed, the longer the range will be. It is also important to follow the guidelines for an antenna installation as thoroughly as possible. Section 4.10 “Mount the VHF Antenna” describes how to best install the VHF antenna.

9.6.4 I can only receive a few GPS satellites

The position of the GPS antenna is of high importance to optimize the GPS reception. Follow the guidelines of GPS antenna installation described in chapter 4.11 “Mount the GPS Antenna” as thoroughly as possible.

If the ship is close to a harbour or shore with high structures or travelling in an area with high terrain, the GPS reception might be worse. The GPS antenna must be installed where it has a clear view of the sky. The objective is to see the horizon freely through 360 degrees with a vertical observation of 5 to 90 degrees above the horizon.

The GPS antenna cable should also be as short as possible and with 50 Ω impedance. A very long antenna cable or faulty impedance can heavily reduce the GPS reception.

9.7 Contacting Support

The primary source for support and RMA issues should for end customers be the local dealer where the equipment was purchased in the first place. Another option is to contact one of our OEM partners or affiliate service stations and request help. An updated list with our dealers, OEM partners and service stations can be found at our website, **Error! Hyperlink reference not valid.** www.saab.com/maritime , listed under the corresponding product.

It is also possible to contact Saab TransponderTech’s technical support if this is preferred.



We recommend contacting us via email at support.transpondertech@saabgroup.com for most accurate and detailed help. If the situation is very urgent then it is of course also possible to call us at normal Swedish workdays and working hours. Telephone **+46-13-189420**.

Before contacting support, always check the following information and include it in the first email, or have it ready at the phone call:

- All the information provided by the SW/HW Info view that can be accessed from **Main Menu** → **Status** → **SW/HW Info**.
- Detailed fault description

9.8 Indication Messages

The indication messages, with identity and type information, are listed below:

ID	Type	Message text
021	Status	External DGNSS in use
022	Status	External GNSS in use
023	Status	Internal DGNSS in use (beacon)
024	Status	Internal DGNSS in use (msg 17)
025	Status	Internal GNSS in use
027	Status	External SOG/COG in use
028	Status	Internal SOG/COG in use
031	Status	Heading valid
033	Status	Rate of Turn Indicator in use
034	Status	Other ROT source in use
036	Event	Channel management parameters changed
037	Status	AIS: Low power tanker mode active
038	Status	AIS: Low power tanker mode
040	Event	AIS: Operating in assigned mode by message 16 from base station MMMMMMMMMM
041	Event	AIS: Operating in data link management mode by message 20 from base station(s) MMMMMMMMMM
042	Event	AIS: Operating in channel management mode by Message 22 from base station MMMMMMMMMM on channel XXXX and XXXX
043	Event	AIS: Operating in group assignment mode by message 23 from base station MMMMMMMMMM
044	Event	AIS: Returning to default operation
056	Event	Channel management zone memory changed
061	Status	Enter semaphore mode
062	Event	Leave semaphore mode
064	Event	RATDMA overflow
067	Status	Beacon correction received



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068	Status	VDL correction received
069	Status	No correction received



9.9 Long Range Definitions

A = Ship's name, call sign, and IMO number

B = Date and time of message composition

C = Position

E = Course over ground (COG)

F = Speed over ground (SOG)

I = Destination and Estimated Time of Arrival (ETA)

O = Draught

P = Ship/Cargo

U = Ship's length, breadth, type

W = Persons on board



10 COMMUNICATION INTERFACES

This section describes the characteristics of the communication interfaces in the R5 SUPREME AIS transponder system.

The system is equipped with RS-422 serial ports as well as an Ethernet network interface.

- Unless otherwise stated, an output sentence is transmitted on the network as well as on all serial ports
- Unless otherwise stated, an input sentence can be received from the network as well as from any serial port

10.1 Serial Ports

The R5 SUPREME AIS transponder has six bi-directional serial ports:

- ECDIS port
- Long-range port
- Sensor port 1,2,3
- Pilot port

The R5 Control and Display Unit is equipped with one bi-directional pilot port

The possibility to input data through a pilot port can be restricted by means of the Pilot Port (Input) setting in the *Misc Interface Configuration* view (section 5.3.17). From this view it is also configurable whether to output data from the AIS transponder internal GPS receiver on a serial port.

Port Baud rates can be individually configured for each port from the *Port Rate Configuration* view (section 5.3.16)

10.2 Ethernet Ports

There is one Ethernet port on the R5 SUPREME AIS transponder and one on the R5 Control and Display Unit. These ports handles datagrams according to the IEC 61162-450 standard.

Transmission group TGTD is used for outgoing messages. The equipment may receive data from transmission group TGTD, NAVD or SATD.

The R5 SUPREME AIS transponder system supports IGMP versions 1, 2 and 3.

To be able to identify source/destination of a datagram on the Ethernet, each datagram is tagged with System Function Identity (SFI). The SFIs for the R5 SUPREME AIS transponder and the R5 CDU are configurable according to the table below.

Unit	Function	System Function Identity
R5 CDU	Main function	SNYYYY
R5 SUPREME AIS transponder	Main function	AIXXXX



10.3 Load Capacity

The R5 CDU is compliant to IEEE 802.3u and can handle following rates of received datagrams:

- 800 datagram/s intended for processing by the unit
- 6000 datagram/s not intended for processing by the unit
- 400 datagram/s intended for processing (50% of the unit max load) and 3500 datagram/s not intended for processing

The R5 SUPREME AIS transponder is compliant to IEEE 802.3u and can handle following rates of received datagrams:

- 270 datagram/s intended for processing by the unit
- 1230 datagram/s not intended for processing by the unit
- 135 datagram/s intended for processing (50% of the unit max load) and 600 datagram/s not intended for processing



11 INTERPRETATIONS OF ALERT SENTENCES

The protocol of the serial input/output sentences shall be compliant to IEC 61162-1 and IEC 61162-2 for maximum interoperability.

11.1 Input Sentences, Alerts

11.1.1 ACN – Alert command

\$--ACN,hhmmss.ss,ccc,x.x,x.x,c,c

Field	Format	Name	Note
1	--ACN	Sentence Id	Used
2	hhmmss. ss	UTC time	
3	ccc	Manufacturer mnemonic code: STT = Proprietary Alert Null = Standard Alert	Used
4	x.x	Alert identifier	Used
5	x.x	Alert instance	Used
6	c	Alert command: A = Acknowledge Q = Request S = Silence	Used
7	c	Sentence status flag (C Always)	Used

11.1.2 ACK – Acknowledge alert (legacy)

\$--ACK,xxx

Field	Format	Name	Comment
1	--ACK	Sentence Id	Used
2	xxx	Alert identifier number	Corresponds to ALR message for alert to acknowledge

11.2 Output Sentences, Alerts

11.2.1 ALC – Cyclic alert list

Output rate: On event, and on request.

\$--ALC,xx,xx,xx,x.x,ccc,x.x,x.x,x.x,...

Field	Format	Name	Note
1	--ALC	Sentence Id	
2	xx	Number of sentences	
3	xx	Sentence number	
4	xx	Sequential identifier	
5	x.x	Number of alert entries	
Fields for one alert entry, repeats "Number of alert entries" times			
6,10, 14,..	ccc	Manufacturer mnemonic code: STT = Proprietary Alert Null = Standard Alert	
7,11, 15,..	x.x	Alert identifier	
8,12, 16,..	x.x	Alert instance	
9,13, 17,..	x.x	Revision counter	



11.2.2 ALF – Alert sentence

Output rate: Output every 30s listing active alerts.

\$--ALF,x,x,x,hhmmss.ss,c,c,c,ccc,x.x,x.x,x.x,x,c-c

Field	Format	Name	Comment
1	--ALF	Sentence Id	
2	x	Number of sentences	
2	x	Sentence number	
3	x	Sequential identifier	
4	hhmmss. ss	UTC time of change	
5	c	Alert category	
6	c	Alert priority: W = Warning C = Caution	
7	c	Alert state: N = Normal V = Active, Unacknowledged A = Active, Acknowledged S = Active, Silenced	
8	ccc	Manufacturer mnemonic code	
9	x.x	Alert identifier	
10	x.x	Alert instance	
11	x.x	Escalation counter	
12	x	Revision counter	
13	c-c	Alert/Description text	

11.2.3 ALR – Alert state

Output rate: On event, on request, and automatically. Output every 30s for active alerts and every 60s when there are no active alerts.

\$--ALR,hhmmss.ss,xxx,c,c,c-c

Field	Format	Name	Comment
1	--ALR	Sentence Id	
2	hhmmss. ss	UTC time of alert condition change	
3	xxx	Unique alert identifier	
4	c	Alert condition: A = Active V = Inactive	
5	c	Acknowledgment state: A = acknowledged V = unacknowledged	
8	c-c	Alert description text	

11.2.4 ARC – Alert command rejection

\$--ARC,hhmmss.ss,ccc,x.x,x.x,c

Field	Format	Name	Comment
1	--ARC	Sentence Id	
2	hhmmss. ss	UTC time of alert condition change	
3	ccc	Manufacturer mnemonic code: STT = Proprietary Alert Null = Standard Alert	
4	x.x	Alert identifier	
5	x.x	Alert instance	
6	c	Alert command: A = Acknowledge Q = Request S = Silence	



12 INTERPRETATION OF INPUT SENTENCES

All interface ports accepts the full set of input listed below sentences, except the sentences listed in section 12.4.1 that are unique to the Long Range interface port.

The protocol of the serial input sentences shall be compliant to IEC 61162-1, IEC 61162-2 for maximum interoperability.

12.1 GNSS and Sensor Input Sentences

12.1.1 DTM – Datum Reference

If local code is other than WGS84, then the positions report from that port is discarded.

\$--DTM,ccc,a,x.x,a,x.x,a,x.x,ccc

Field	Format	Name	Comment
1	--DTM	Sentence Id	Used
2	ccc	Local Datum Code	Interpret if it's WGS84 or not
3	A	Local Datum Subdivision Code	Ignored
4	x.x	Lat Offset (2 fields)	Ignored
5	a		Ignored
6	x.x	Long Offset (2 fields)	Ignored
7	a		Ignored
8	x.x	Altitude Offset	Ignored
9	ccc	Reference Datum Code	Ignored

12.1.2 GBS – GNSS Satellite Fault Detection

If this sentence is received once a second from the position source in use, the RAIM flag will be set to TRUE.

\$--GBS,hhmmss.ss,x.x,x.x,x.x,xx,x.x,x.x,x.x

Field	Format	Name	Comment
1	--GBS	Sentence Id	Used
2	hhmmss.ss	UTC Time of GGA or GNS	Ignored
3	x.x	Expected Error in latitude	Used
4	x.x	Expected Error in longitude	Used
5	x.x	Expected error in altitude	Ignored
6	xx	ID number of most likely failed satellite	Ignored
7	x.x	Probability of missed detection	Ignored
8	x.x	Estimate of bias in meters	Ignored
9	x.x	Standard Deviation of bias estimate	Ignored

12.1.3 GGA – Global Positioning System Fix Data

\$--GGA,hhmmss.ss,llll.ll,a,yyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx

Field	Format	Name	Comment
1	--GGA	Sentence Id	Used
2	hhmmss.ss	UTC of position	UTC Second is used to indicate Time Stamp
3	llll.ll	Latitude	Used
4	a		
5	yyyy.yy	Longitude	Used
6	a		
7	x	GPS quality indicator	Used, 1 -> Position with Low Accuracy 2 -> Position with High Accuracy 3 -> Position with Low Accuracy



Field	Format	Name	Comment
			6 -> Dead Reckoning with Low Accuracy 7 -> Manual mode with low accuracy OTHER -> No Position Used when the GPS is the internal GPS (Used in proprietary sentences)
8	xx	Satellites in use	Ignored
9	x.x	Horizontal dilution of precision	Ignored
10	x.x	Antenna altitude	Ignored
11	M	Units of antenna altitude, meter	Ignored
12	x.x	Geodial separation	Ignored
13	M	Units of geodial sep.	Ignored
14	x.x	Age of differential GPS data	Ignored
15	xxxx	Differential reference station ID	Ignored

12.1.4 GLL – Geographic position, latitude/longitude

\$-GLL,llll.ll,a,yyyy.yy,a,hhmmss.ss,A,a

Field	Format	Name	Comment
1	--GLL	Sentence Id	Used
2	llll.ll	Latitude	Used
3	a		
4	yyyy.yy	Longitude	Used
5	a		
6	hhmmss.ss	UTC of position	UTC Second is used to indicate Time Stamp
7	A	Status	Used
8	a	Mode indicator	NULL -> Message is ignored A -> Position with Low Accuracy D -> Position with High Accuracy E -> Dead Reckoning Mode with Low Accuracy M -> Manual Mode with Low Accuracy OTHER -> No Position

12.1.5 GNS – GNSS fix data

If the Mode Indicator is a NULL field, the sentence is ignored.

\$-GNS,hhmmss.ss,llll.ll,a,yyyy.yy,a,c--c,xx,x.x,x.x,x.x,x.x,x.x

Field	Format	Name	Comment
1	--GLL	Sentence Id	Used
2	hhmmss.ss	UTC of position	UTC Second is used to indicate Time Stamp
3	llll.ll	Latitude	Used
4	a		
5	yyyy.yy	Longitude	Used
6	a		
7	c--c	Mode indicator	A, P -> Position with low accuracy D, R, F -> Position with high Accuracy E -> Dead Reckoning Mode with Low accuracy M -> Manual Mode with low accuracy OTHER -> No Position
8	xx	Total number of satellites	Used when the GPS source is the internal GPS (used in proprietary sentences)
9	x.x	HDOP	Ignored



Field	Format	Name	Comment
10	x.x	Antenna altitude, meter	Ignored
11	x.x	Geodial separation	Ignored
12	x.x	Age of differential corrections	Ignored
13	x.x	Differential reference station ID	Ignored

12.1.6 HDT – Heading, True

The use of this sentence is talker identifier dependent.

\$--HDT,x.x,T

Field	Format	Name	Comment
1	--HDT	Sentence Id	Used
2	x.x	Heading, degrees true	Used
3	T		

NOTE: HDT input must be received at least every 3 seconds for the R5 SUPREME to calculate ROT from the HDT input.

12.1.7 OSD – Own ship data

\$--OSD,x.x,A,x.x,a,x.x,a,x.x,x.x,a

Field	Format	Name	Comment
1	--OSD	Sentence Id	Used
2	x.x	Heading, degrees true	Used if heading status is 'A'
3	A	Heading status	Used
4	x.x	Vessel course, degrees true	Used as COG
5	a	Course reference	Used ¹
6	x.x	Vessel speed	Used as SOG
7	a	Speed reference	Used ¹
8	x.x	Vessel set	Ignored
9	x.x	Vessel drift	Ignored
10	a	Speed units	Used to convert SOG to knots

12.1.8 RMC – Recommended minimum specific GNSS data

\$--RMC,hhmmss.ss,A,llll.ll,a,yyyy.yy,a,x.x,x.x,xxxxxx,x.x,a,a

Field	Format	Name	Comment
1	--RMC	Sentence Id	Used
2	hhmmss.ss	UTC of position	UTC Second is used to indicate Time Stamp
3	A	Status	Used
4	llll.ll	Latitude	Used
5	a		
6	yyyy.yy	Longitude	Used
7	a		
8	x.x	Speed over ground, knots	Used
9	x.x	Course over ground, degrees true	Used
10	xxxxxx	Date	Ignored
11	x.x	Magnetic variation	Ignored
12	a		
13	a	Mode indicator	NULL -> Message is ignored A -> Position with low accuracy D -> Position with high accuracy E -> Dead Reckoning Mode with Low accuracy M -> Manual Mode with low accuracy OTHER -> No Position

¹ SOG and COG are used if both COG reference and SOG reference are set to either: B, P, R



12.1.9 ROT – Rate of turn

The rate of turn value is only used if the talker identifier is TI. Otherwise the value will only be used to determine the direction, i.e. "Moving Right" or "Moving Left".

\$--ROT,x.x,A

Field	Format	Name	Comment
1	--ROT	Sentence Id	Used
2	x.x	Rate of turn	Used if Status is set to 'A'
3	A	Status	Used

12.1.10 THS – True Heading and Status

\$--THS,x.x,a

Field	Format	Name	Comment
1	--THS	Sentence Id	Used
2	x.x	Heading, degrees true	Used if Status is set to 'A'
3	a	Status	Used

NOTE: THS input must be received at least every 3 seconds for the R5 SUPREME to calculate ROT from the THS input.

12.1.11 VBW – Dual Ground / Water Speed

The current position source must be external GPS, and heading must be available for the transponder to accept this sentence.

\$--VBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A

Field	Format	Name	Comment
1	--ROT	Sentence Id	Used
2	x.x	Longitudinal water speed	Ignored
3	x.x	Transverse water speed	Ignored
4	A	Status: water speed	Ignored
5	x.x	Longitudinal ground speed	Used if Status is set to A
6	x.x	Transverse ground speed	Used if Status is set to A
7	A	Status: ground speed	Used
8	x.x	Stern transverse water speed	Ignored
9	A	Status stern water speed	Ignored
10	x.x	Stern transverse ground speed	Ignored
11	A	Status stern ground speed	Ignored

12.1.12 VTG – Course over ground and ground speed

\$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a

Field	Format	Name	Comment
1	--VTG	Sentence Id	Used
2	x.x	Course over ground, degrees	Used
3	T	true	
4	x.x	Course over ground, degrees	Ignored
5	M	magnetic	
6	x.x	Speed over ground, knots	Used
7	N		
8	x.x	Speed over ground, km/h	Ignored
9	K		
10	a	Mode indicator	Used



12.1.13 ZDA – Time and date

This message is received but not used by the standard R5 SUPREME AIS transponder system.

\$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx

Field	Format	Name	Comment
1	--ZDA	Sentence Id	Used
2	hhmmss.ss	UTC	Used
3	xx	Day (UTC)	Used
4	xx	Month (UTC)	Used
5	xxxx	Year (UTC)	Used
6	xx	Local zone hours	Ignored
7	xx	Local zone minutes	Ignored

12.2 General Input Sentences

12.2.1 EPV – Command or report equipment property value

\$--EPV,a,c--c,c--c,x.x,c--c,

Field	Format	Name	Comment
1	--EPV	Sentence Id	Used
2	a	Sentence status flag	Used
3	c--c	Destination equipment type	Used, AI or STT
4	c--c	Unique Identifier	Used, may be null
5	x.x	Property identifier	Used
6	c--c	Value of property to be set	Used

12.2.2 SPW – Security Password Sentence

\$--SPW,ccc,c--c,x,c--c

Field	Format	Name	Comment
1	--SPW	Sentence Id	Used
2	ccc	Password protected senece	Used
3	c--c	Unique Identifier	Used, may be NULL
4	x	Password level	Used
5	c--c	Password	Used

12.2.3 SSA – Sender Signature Authentication

\$--SSA,ccc,c,h--h

Field	Format	Name	Comment
1	--SSA	Sentence Id	Used
2	ccc	Signature protected senece	Used
3	c	Signature calculation method	Used
4	h--h	Signature authentication	Used

12.2.4 HBT – Heartbeat Supervision Sentence

\$--HBT,x.x,A,x

Field	Format	Name	Comment
1	--HBT	Sentence Id	Used
2	x.x	Configured repeat interval	Used (Limited to 60 sec)
3	A	Equipment status	Used
4	x	Sequential sentence identifier	Ignored



12.3 AIS Specific Input Sentences

12.3.1 ABM – Addressed Binary and Safety-Related Message

!--ABM,x,x,x,XXXXXXXXXX,X,X.X,S--S,X

Field	Format	Name	Comment
1	--ABM	Sentence Id	Used
2	x	Total nr of sentences	Used if in interval 1..9, otherwise the sentence is ignored
3	x	Sentence number	Used if in interval 1..total sentences, otherwise the sentence is ignored
4	x	Sequential message identifier	Used if in interval 0..3, otherwise the sentence is ignored
5	xxxxxxx xxx	MMSI of Destination	Used
6	X	AIS Channel	Used
7	x.x	Message Id	Used if 6 or 12, otherwise the sentence is ignored
8	s--s	Encapsulated Data	Used
9	x	Number of filled bits	Used

12.3.2 ACA – AIS Regional Channel Assignment Message

The zone created of this sentence must be accepted by the channel management rules (size of zone, distance to own position, valid channel number etc). If the zone isn't accepted, the zone will be ignored.

\$--ACA,x,llll.ll,a,yyyy.yy,a,llll.ll,a,yyyy.yy,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.ss

Field	Format	Name	Comment
1	--ACA	Sentence Id	Used
2	x	Sequence number	Ignored
3	llll.ll	NE latitude (2 fields)	Used
4	a		
5	yyyy.yy	NE longitude (2 fields)	Used
6	a		
7	llll.ll	SW latitude (2 fields)	Used
8	a		
9	yyyy.yy	SW longitude (2 fields)	Used
10	a		
11	x	Transitional zone size	Used
12	xxxx	Channel A	Used
13	x	Channel A bandwidth	Used
14	xxxx	Channel B	Used
15	x	Channel B bandwidth	Used
16	x	Tx/Rx mode	Used
17	x	Power level	Used
18	a	Information source	Ignored
19	x	In use flag	Ignored
20	hhmmss. ss	Time of In use change	Ignored

12.3.3 AIQ – Query Sentence

\$--AIQ,ccc

Field	Format	Name	Comment
1	--	Talker ID of requester	Used



Field	Format	Name	Comment
2	AIQ	Talker ID for device	Used
3	ccc	Approved sentence formatter of data being requested	It's possible to query the following sentences: ACA, ALR, EPV, LRI, SSD, TRL, TXT and VSD

12.3.4 AIR – AIS Interrogation Request

This sentence can also be used to do a “UTC Request”.

\$--AIR,xxxxxxxx,x.x,x.x,x,xxxxxxxx,x.x,x

Field	Format	Name	Comment
1	--AIR	Sentence Id	Used
2	xxxxxxxx xx	MMSI 1	Used
3	x.x	Message ID 1.1	Used
4	x	Message sub section	Ignored
5	x.x	Message ID 1.2	Used, may be NULL
6	x	Message sub section	Ignored
7	xxxxxxxx xx	MMSI 2	Used, may be NULL
8	x.x	Message ID 2.1	Used, may be NULL
9	x	Message sub section	Ignored
10	x	Channel	Used, may be NULL

12.3.5 BBM – Broadcast Binary Message

\$--BBM,x,x,x,x,x,x,s--s,x

Field	Format	Name	Comment
1	--BBM	Sentence Id	Used
2	X	Total number of sentences	Used if in interval 1..9, otherwise rejected
3	X	Sentence number	Used if in interval 1..total number of sentences, otherwise rejected.
4	X	Sequential message identifier	Used if in interval 0..9, otherwise rejected
5	X	AIS channel	Used
6	x.x	Message Id	Used if 8 or 14
7	s-s	Encapsulated data	Used
8	X	Number of filled bits	Used

12.3.6 SSD – Ship Static Data

\$--SSD,c--c,c--c,xxx,xxx,xx,xx,c,aa

Field	Format	Name	Comment
1	--SSD	Sentence Id	Used
2	c--c	Call sign	Used, may be NULL
3	c--c	Name	Used, may be NULL
4	xxx	Pos ref A	Used to change position reference for the position source in use. May be NULL.
5	xxx	Pos ref B	Used to change position reference for the position source in use. May be NULL.
6	xx	Pos ref C	Used to change position reference for the position source in use. May be NULL.
7	xx	Pos ref D	Used to change position reference for the position source in use. May be NULL.
8	c	DTE	Ignored



Field	Format	Name	Comment
9	aa	Source identifier	Used

12.3.7 VSD – Voyage Static Data

\$--VSD,x.x,x.x,x.x,c--c,hhmmss.ss,xx,xx,x.x,x.x

Field	Format	Name	Comment
1	--VSD	Sentence Id	Used
2	x.x	Type of ship and cargo	Used
3	x.x	Maximum present draught	Used
4	x.x	Persons on-board	Used
5	c--c	Destination	Used
6	hhmmss.ss	Est. UTC of arrival	Used
7	Xx	Est. day of arrival	Used
8	Xx	Est. month of arrival	Used
9	x.x	Navigational status	Used
10	x.x	Regional application flags	Used

12.4 Long Range Input Sentences

12.4.1 On Long Range Port

The LR sentences can only be used with the Long Range interface port.

12.4.1.1 LRF – AIS long-range function

\$-LRF,x,xxxxxxxx,c—c,c—c,c—c

Field	Format	Name	Comment
1	--LRF	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxx xx	MMSI of requestor	Used
4	c--c	Name of requestor	Used
5	c--c	Function request	Used
6	c--c	Function reply status	Used

12.4.1.2 LRI – AIS long-range interrogation

\$-LRI,x,a,xxxxxxxx,xxxxxxxx,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a

Field	Format	Name	Comment
1	--LRI	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxx xx	MMSI of requestor	Used
4	xxxxxxx x	MMSI of destination	Used
5	llll.ll	Latitude	Used
6	a	N / S	Used
7	yyyyy.y y	Longitude	Used
8	a	E / W	Used

12.4.2 On Other Input Ports

12.4.2.1 LRF – AIS long-range function

\$-LRF,x,xxxxxxxx,c—c,c—c,c—c

Field	Format	Name	Comment
1	--LRF	Sentence Id	Used
2	x	Sequence number	Used



Field	Format	Name	Comment
3	xxxxxxx xx	MMSI of requestor	Used
4	c--c	Name of requestor	Used
5	c--c	Function request	Used
6	c--c	Function reply status	Used

12.5 Proprietary Input Sentences

All Saab TransponderTech Proprietary Sentences will have talker ID PSTT.

12.5.1 Proprietary Query message PSTT,101

\$PSTT,101,c--c

Field	Format	Name	Comment
1	PSTT	Proprietary SAAB TranspondeTech Sentence	Used
2	101	Sentence Query	Used
3	c--c	Proprietary sentence to query	Used



13 INTERPRETATION OF OUTPUT SENTENCES

13.1 General Output Sentences

13.1.1 HBT – Heartbeat Supervision Sentence

This sentence is only transmitted on the network interface.

\$--HBT,x.x,A,x

Field	Format	Name	Comment
1	--HBT	Sentence Id	HBT always
2	x.x	Configured repeat interval	30 seconds
3	A	Equipment status	A=Normal
4	x	Sequential sentence identifier	Cyclic 0 to 9

13.2 Proprietary Output Sentences (PSTT)

In addition to the standardized IEC sentences, the R5 SUPREME System is able to output the proprietary sentences listed below. All Saab TransponderTech Proprietary Sentences have talker ID "PSTT".

13.2.1 \$PSTT,10A – UTC Date and Time

This sentence provides UTC Date and Time, i.e. R5 SUPREME system time (based on internal GNSS time). It is output approximately once every 10 seconds (± 1 s).

\$PSTT,10A,YYYYMMDD,HHMMSS

Field	Format	Name	Comment
1	10A	Sentence Id	10A always
2	YYYYMMDD	Date	Year, month and day in decimal notation. (00000000 = Not available)
3	HHMMSS	Time	Hour, minute and second in decimal notation. (999999 = Not available)

Example: \$PSTT,10A,20121028,135230*<FCS><CR><LF>

= Date October 28, 2012

= Time 13:52:30 UTC

13.2.2 \$PSTT,10C – Data Link Status

This sentence provides information about the traffic on the VHF data link. It is output approximately once every 60 seconds. Traffic load is calculated over the last frame (i.e. 60 seconds). Number of units is derived from the internal user list and is generally the number of received units within the last few minutes.

\$PSTT,10C,C,LLL,NNNN

Field	Format	Name	Comment
1	10C	Sentence Id	10C always
2	C	Channel	A = VDL Channel A B = VDL Channel B
3	LLL	Traffic Load	Data link traffic load in percent, 0-100.
4	NNNN	Number of Units	Number of units occupying the data link



13.2.3 \$PSTT,106 – Notification

This sentence is output when a notification’s state is changed and, if active, it is output cyclic once every minute.

\$PSTT,106,AI,x.x,c,hhmmss.ss,c-c*hh<CR><LF>

Field	Format	Name	Comment
1	101	Sentence Id	106 always
2	AI	Talker Id	AI always
3	x.x	Identifier	See notification list
4	c	Notification State	N = Normal V = Active, Unacknowledged A = Active, Acknowledged P = Popup Only W = Active, Unacknowledged with popup
5	hhmmss.ss	UTC Time	
6	c-c	Description	Notification text

Notification list

Identifier	Description Text	Active when
401	NavStatus 12 activated. Extended dimensions properly set?	NavStatus 12 is selected
402	No extended dimension set with NavStatus 12 active	Extended dimensions set to zero when NavStatus 12 is active
403	Ship dimensions incomplete	Ship dimensions are zero

13.2.4 \$PSTT,146 – System Operational Mode Status

This sentence reports the system operational mode. This sentence is output on change, periodically every minute and on request using PSTT,101.

\$PSTT,146,x,x,x

Field	Format	Name	Comment
1	146	Sentence Id	146 always
2	X	1 W Mode	0 = Default 1 = 1 Watt
3	X	System Mode	0 = Class A 1 = Inland
4	X	Transmit mode	0 = Normal 1 = Silent

13.2.5 \$PSTT,1F3 – Transponder Restart

This sentence will be output when the transponder has restarted.

\$PSTT,1F3,R

Field	Format	Name	Comment
1	1F3	Sentence Id	1F3 always
2	R	Restart Reason	0 = Unknown 1 = Cold Start 2 = General Protection Fault 3 = Power Fail 4 = Warm Start



13.3 Long Range Output Sentences

13.3.1 On Long Range Port

13.3.1.1 LR1 – AIS long-range reply sentence 1

\$--LR1,x,xxxxxxxx,xxxxxxxx,c--c,c--c,xxxxxxxx

Field	Format	Name	Comment
1	--LR1	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxx xx	MMSI of responder	Used
4	xxxxxxx xx	MMSI of requestor (reply destination)	Used
5	c--c	Ship's name	Used
6	c--c	Call sign	Used
7	xxxxxxx xx	IMO Number	Used

13.3.1.2 LR2 – AIS long-range reply sentence 2

\$--LR2,x,xxxxxxxx,xxxxxxxx,hhmmss.ss,llll.ll,a,yyyy.yy,a,x.x,T,x.x,N

Field	Format	Name	Comment
1	--LR2	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxx xx	MMSI of responder	Used
4	xxxxxxx x	Date	Used
5	hhmmss. ss	UTC time of position	Used
6	llll.ll	Latitude	Used
7	a	N / S	Used
8	yyyyy.y y	Longitude	Used
9	a	E / W	Used
10	x.x	Course over ground	Used
11	T	Validity of COG	Used
12	x.x	Speed over ground	Used
13	N	Validity of SOG	Used

13.3.1.3 LR3 – AIS long-range reply sentence 3

\$--LR3,x,xxxxxxxx,c--c,xxxxxx,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x

Output rate: On event

Field	Format	Name	Comment
1	--LR3	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxx xx	MMSI of responder	Used
4	c--c	Voyage destination	Used
5	xxxxxxx x	ETA Date	Used
6	hhmmss. ss	ETA time	Used
7	x.x	Draught	Used
8	x.x	Ship / Cargo	Used
9	x.x	Ship length	Used
10	x.x	Ship width	Used
11	x.x	Ship type	Used
12	x.x	Persons	Used



13.3.1.4 LRF – AIS long-range function

\$--LRF,x,xxxxxxxx,c--c,c--c,c--c

Output rate: On event

Field	Format	Name	Comment
1	--LRF	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxx xx	MMSI of requestor	Used
4	c--c	Name of requestor	Used
5	c--c	Function request	Used
6	c--c	Function reply status	Used

13.3.2 On All Other Output Ports

13.3.2.1 LRF – AIS long-range function

\$--LRF,x,xxxxxxxx,c--c,c--c,c--c

Output rate: On event

Field	Format	Name	Comment
1	--LRF	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxx xx	MMSI of requestor	Used
4	c--c	Name of requestor	Used
5	c--c	Function request	Used
6	c--c	Function reply status	Used

13.3.2.2 LRI – AIS long-range interrogation

\$--LRI,x,a,xxxxxxxx,xxxxxxxx,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a

Output rate: On event

Field	Format	Name	Comment
1	--LRI	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxx xx	MMSI of requestor	Used
4	xxxxxxx x	MMSI of destination	Used
5	llll.ll	Latitude	Used
6	a	N / S	Used
7	YYYYY.Y y	Longitude	Used
8	a	E / W	Used



13.4 AIS Output Sentences

13.4.1 ABK – AIS Addressed and binary broadcast acknowledgement

\$ -- ABK,xxxxxxxxx,x,x.x,x,x

Output rate: On event.

Field	Format	Name	Comment
1	--ABK	Sentence Id	Used
2	xxxxxxxxxx	MMSI of the addressed AIS unit	Used
3	x	AIS channel of reception	Used
4	x.x	ITU - R M.1371 Message ID	Used
5	x	Message sequence number	Used
6	x	Type of acknowledgement	Used

13.4.2 ACA – AIS Regional Channel Assignment Message

\$--ACA,x,llll.ll,a,yyyy.yy,a,llll.ll,a,yyyy.yy,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.ss

Output rate: On event. On request.

Field	Format	Name	Comment
1	--ACA	Sentence Id	Used
2	x	Sequence number	Ignored
3	llll.ll	NE latitude (2 fields)	Used
4	a		
5	yyyy.yy	NE longitude (2 fields)	Used
6	a		
7	llll.ll	SW latitude (2 fields)	Used
8	a		
9	yyyy.yy	SW longitude (2 fields)	Used
10	a		
11	x	Transitional zone size	Used
12	xxxx	Channel A	Used
13	x	Channel A bandwidth	Used
14	xxxx	Channel B	Used
15	x	Channel B bandwidth	Used
16	x	Tx/Rx mode	Used
17	x	Power level	Used
18	a	Information source	Ignored
19	x	In use flag	Ignored
20	hhmmss.ss	Time of In use change	Ignored



13.4.3 EPV – Command or report equipment property value

\$--EPV,a,c--c,c--c,x.x,c—c

Output rate: On request.

Field	Format	Name	Comment
1	--EPV	Sentence Id	Used
2	a	Sentence status flag	Used
3	c--c	Destination equipment type	Used
4	c--c	Unique Identifier	Used
5	x.x	Property identifier	Used
6	c--c	Value of property	Used

13.4.4 NAK – Negative acknowledgement

\$--NAK,cc,ccc,c--c,x.x,c—c

Output rate: On event

Field	Format	Name	Comment
1	--NAK	Sentence Id	Used
2	cc	Talker identifier	Used
3	ccc	Affected sentence formatter	Used
4	c--c	Unique Identifier	Used
5	x.x	Reason code for negative acknowledgement	Used
6	c--c	Negative acknowledgement's descriptive text	Used

13.4.5 SSD – Ship Static Data

\$--SSD,c--c,c--c,xxx,xxx,xx,xx,c,aa

Output rate: On request.

Field	Format	Name	Comment
1	--SSD	Sentence Id	Used
2	c--c	Call sign	Used, may be NULL
3	c--c	Name	Used, may be NULL
4	xxx	Pos ref A	Used to change position reference for the position source in use. May be NULL.
5	xxx	Pos ref B	Used to change position reference for the position source in use. May be NULL.
6	xx	Pos ref C	Used to change position reference for the position source in use. May be NULL.
7	xx	Pos ref D	Used to change position reference for the position source in use. May be NULL.
8	c	DTE	Ignored
9	aa	Source identifier	Ignored



13.4.6 TRL – AIS transmitter non functioning log

\$--TRL,x.x,x.x,x,xxxxxxxx,hhmmss.ss,xxxxxxxx,hhmmss.ss,x

Output rate: On request. Up to 10 sentences in a burst.

Field	Format	Name	Comment
1	--TRL	Sentence Id	Used
2	x.x	Total number of log entries	Used
3	x.x	Log entry number	Used
4	x	Sequential message identifier	Used
5	xxxxxxxx	Switch off date	Used
6	hhmmss.ss	Switch off UTC time	Used
7	xxxxxxxx	Switch on date	Used
8	hhmmss.ss	Switch on UTC time	Used
9	X	Reason code1	Used

13.4.7 TXT – Text transmission

\$--TXT,xx,xx,xx,c--c

Output rate: On request, on event.

Field	Format	Name	Comment
1	--TXT	Sentence Id	Used
2	xx	Total number of sentences	Used
3	xx	Sentence number	Used
4	xx	Text identifier	Used
5	c--c	Text message	Used

13.4.8 VDM – AIS VHF data-link message

!--VDM,x,x,x,a,s—s,x

Only output on serial port when baud rate is 38400 bps or higher.

Output rate: On VHF message receive event.

Field	Format	Name	Comment
1	--VDM	Sentence Id	Used
2	x	Total number of sentences needed to transfer the message	Used
3	x	Sentence number	Used
4	x	Sequential message identifier	Used
5	a	AIS channel	Used
6	s-s	Encapsulated ITU-R M.1371 radio message	Used
7	x	Number of fill bits	Used



13.4.9 VDO – AIS VHF data-link own-vessel report

!--VDO,x,x,x,a,s—s,x

Only output on serial port when baud rate is 38400 bps or higher.

Output rate: On VHF transmission event. “Dummy” messages once per second.

Field	Format	Name	Comment
1	--VDO	Sentence Id	Used
2	x	Total number of sentences needed to transfer the message	Used
3	x	Sentence number	Used
4	x	Sequential message identifier	Used
5	a	AIS channel	Used for transmission event. Not used for “dummy” position messages.
6	s-s	Encapsulated ITU-R M.1371 radio message	Used
7	x	Number of fill bits	Used

13.4.10 VER – Version

\$--VER,x,x,aa,c--c,c--c,c--c,c--c,c--c,x

Output rate: On request.

Field	Format	Name	Comment
1	--VER	Sentence Id	Used
2	x	Total number of sentences	Always 1
3	x	Sentence number	Always 1
4	aa	Device Type	Used
5	c--c	Vendor ID	Used
6	c--c	Unique Identifier	Used
7	c--c	Manufacturer serial number	Used
8	c--c	Model code	Used
9	c--c	Software revision	Used
10	c--c	Hardware revision	Used
11	x	Sequential message identifier	Always NULL

13.4.11 VSD – Voyage Static Data

\$--VSD,x.x,x.x,x.x,c--c,hmmss.ss,xx,xx,x.x,x.x

Output rate: On request.

Field	Format	Name	Comment
1	--VSD	Sentence Id	Used
2	x.x	Type of ship and cargo	Used
3	x.x	Maximum present draught	Used
4	x.x	Persons on-board	Used
5	c--c	Destination	Used
6	hmmss.ss	Est. UTC of arrival	Used
7	Xx	Est. day of arrival	Used
8	Xx	Est. month of arrival	Used
9	x.x	Navigational status	Used
10	x.x	Regional application flags	Used

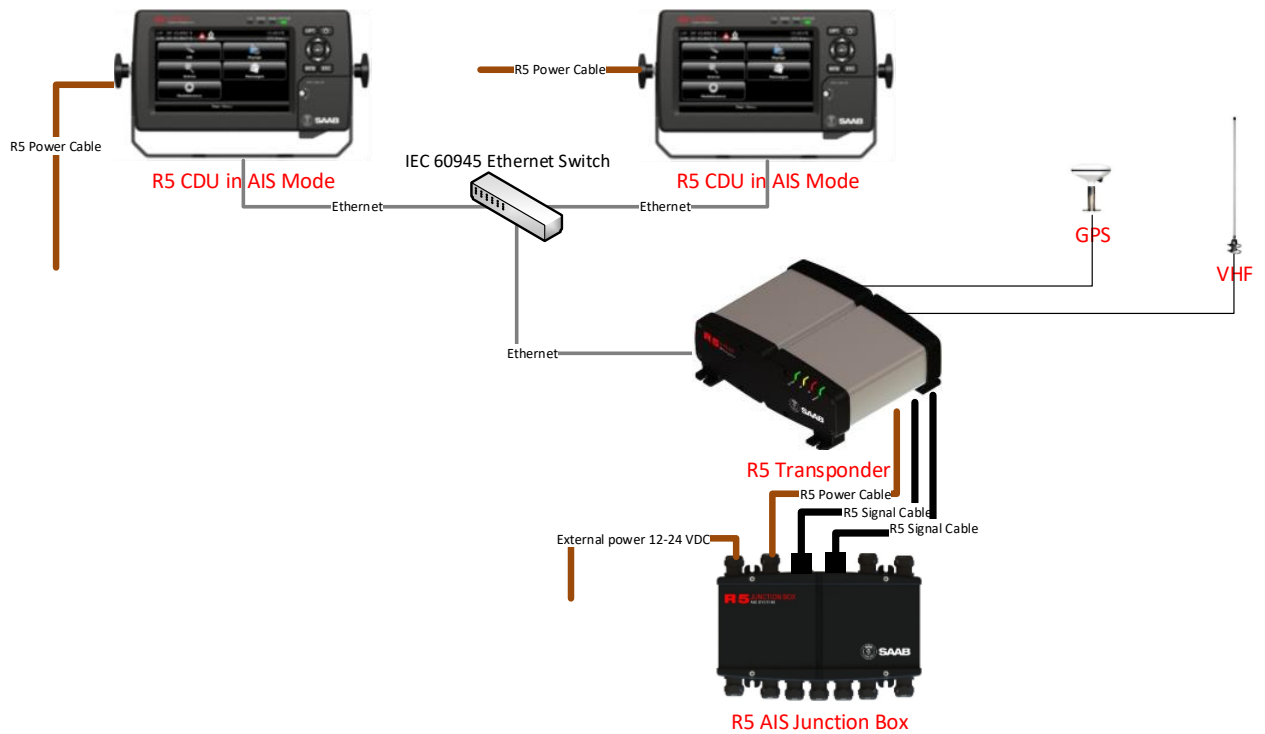


14 ALTERNATE SYSTEM SETUPS

14.1 Dual CDU

Additional R5 CDU units can be connected to the same R5 SUPREME transponder, if connected to the same network.

NOTE: If using two or more CDU units connected to the same transponder, it is important to only do AIS configuration from one unit at a time. Failure to do so may result in unexpected results.



HW Parts in addition to a standard R5 SUPREME AIS kit:

R5 CDU - 7000 118-530

R5 Power Cable, 2m - 7000 118-077

2 x R5 SUPREME Ethernet Cable, 5m - 7000 000-525

Ethernet switch



14.2 Combined AIS and Navigation system setup

Below details how to install a combined R5 SUPREME AIS and Navigation system, using one CDU.

The CDU can act as both AIS MKD and Navigation system at the same time. The initial system setup wizard will activate the correct dialogs and menus.

Running the CDU in this mode will activate many more functions and views, not detailed in this manual. For information about navigation functions and setup, refer to the R5 SUPREME Navigation System MkII manual 7000 118-383.

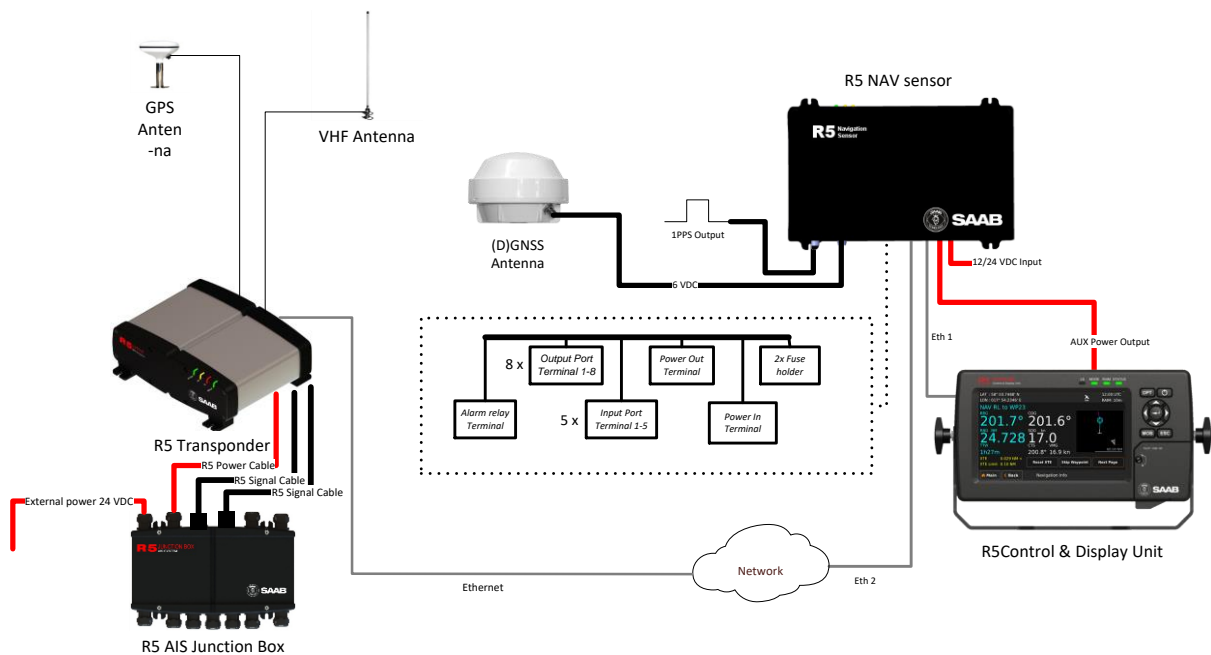


Figure 58- Combined AIS and Navigation system

HW Parts in addition to a standard R5 SUPREME AIS kit:

Name	Part number
Navigation Sensor options	
R5 GNSS Navigation Sensor	7000 118-770
R5 DGNSS Navigation Sensor	7000 118-771
Navigation Sensor Antenna options	
MGA-3 GNSS Antenna	7000 000-554
MGL-5 DGNSS Antenna	7000 000-555
A43 DGNSS Antenna	7000 000-651
R5 Ethernet Cable 5m IEC 60332-1, LSHF	7000 000-525



NOTE: Network IP address must be properly selected in order to enable software updates of the R5 SUPREME AIS Transponder from the CDU in a combined AIS and Navigation system setup. Recommended settings are provided in the table below. This recommendation is based on using default settings for all equipment (including default netmask 255.255.0.0) except for the R5 SUPREME AIS Transponder.

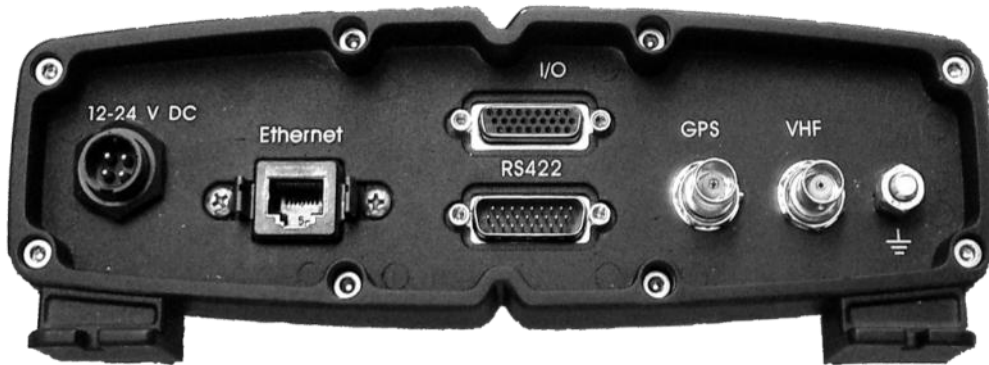
Equipment	Port	IP address	Note
R5 Navigation Sensor MkII	Ethernet 1	172.16.0.4	Default, connect to CDU
R5 Navigation Sensor MkII	Ethernet 2	172.17.0.4	Default, connect to AIS transponder
R5 SUPREME CDU	Ethernet	172.16.0.1	Default
R5 SUPREME AIS Transponder	Ethernet	172.17.0.2	Default is 172.16.0.2



15 ELECTRICAL INTERFACES

For details in RS-422 Baud rates and Sensor input priority please see section 4.12.1 “Input port priority”

15.1 Transponder interface details



15.1.1 RS422 port - 26-pole H.D.D-SUB Male

Pin	In/Out	Signal Name	Signal Type
1	Out	ECDIS - TxB (+)	RS422
2	Out	ECDIS - TxA (-)	RS422
3	In	Sensor1 - RxB (+)	RS422
4	In	Sensor1 - RxA (-)	RS422
5	In	Sensor2 - RxB (+)	RS422
6	In	Sensor2 - RxA (-)	RS422
7	In	Long Range - RxB (+)	RS422
8	In	Long Range - RxA (-)	RS422
9	-	Long Range - GND	RS422
10	-	ECDIS - GND	RS422
11	In	ECDIS - RxB (+)	RS422
12	In	ECDIS - RxA (-)	RS422
13	-	Sensor1 - GND	RS422
14	-	Sensor2 - GND	RS422
15	In	Sensor3 - RxB (+)	RS422
16	In	Sensor3 - RxA (-)	RS422
17	Out	Long Range - TxB (+)	RS422
18	Out	Long Range - TxA (-)	RS422
19	-	Alarm Relay - GND	-
20	Out	Alarm Relay - Out	-
21	-	GND	-
22	-	-	-
23	-	Sensor3 - GND	RS422
24	-	Alarm Relay - VCC	-
25	-	-	-
26	-	-	-



Table 14 – Transponder RS422 Port

15.1.2 I/O port - 26-pole H.D.D-SUB Female

Pin	In/Out	Signal Name	Signal Type
1	Out	Sensor 1 – TxB (+)	RS422
2	Out	Sensor 1 – TxA (-)	RS422
3	-	GND	-
4	-	GND	-
5	Out	Sensor 2 – TxA (-)	RS422
6	Out	Sensor 2 – TxB (+)	RS422
7	Out	Sensor 3 – TxA (-)	RS422
8	Out	Sensor 3 – TxB (+)	RS422
9	In	SW LOAD	Binary
10	-	GND	-
11	In/Out	USB Host (-)	Differential USB
12	In/Out	USB Host (+)	Differential USB
13	-	USB Host VCC	-
14	-	GND	-
15	In	Pilot Port – RxA (-)	RS422
16	In	Pilot Port – RxB (+)	RS422
17	Out	Pilot Port – TxA (-)	RS422
18	Out	Pilot Port – TxB (+)	RS422
19	In	General I/O 3 – In	Binary
20	Out	General I/O 0 – Out	Binary
21	In	General I/O 2 – In	Binary
22	Out	General I/O 1 – Out	Binary
23	In	General I/O 1 – In	Binary
24	Out	General I/O 2 – Out	Binary
25	Out	General I/O 3 – Out	Binary
26	In	General I/O 0 – In	Binary

Table 15 – I/O Transponder Port

15.1.3 Power port

Pin	In/Out	Signal Name	Signal Type
1	In	PWR +	24 VDC
2	In	PWG GND	0 VDC
3	In	Ext Switch R	See instr.
4	In	Ext Switch F	See instr.

15.1.4 Ethernet port – RJ-45 100 MBit – IEC 61162-450

15.1.5 GPS port - TNC (Female) - 5 VDC

15.1.6 VHF port - BNC (Female)

15.1.7 GND Screw – M6

15.2.2 Internal Screw terminals and components

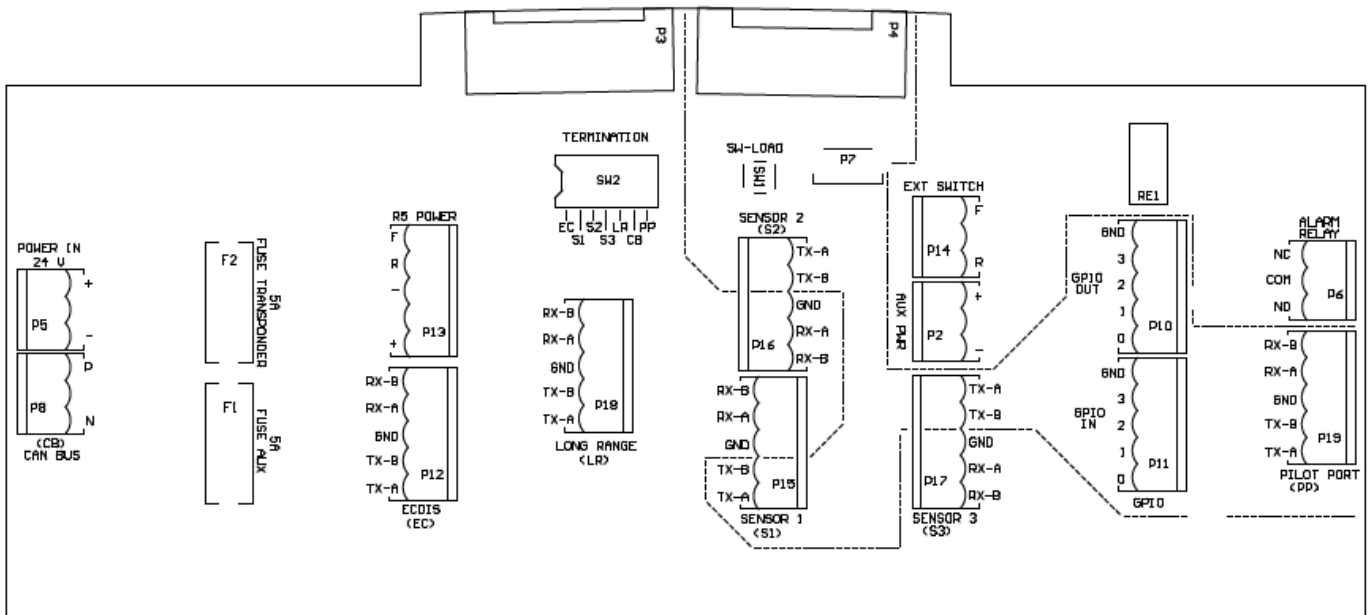


Figure 60 – Circuit Board Layout and markings

The table below details all the screw terminal connections when connected with two R5 Signal Cables to an R5 SUPREME Transponder

Item ¹	Terminal Marking	Pin Marking	Signal	Connects to
P2	AUX PWR	+	Ext Power Out by AUX PWR FUSE	CDU R5 Power Cable Red
		-	Power Out -	CDU R5 Power Cable Black
P5	POWER IN	+	Ext Power In +	External power
		-	Ext Power In -	External power
P6	ALARM RELAY	NC	Alarm Relay NC	Junction box Alarm relay
		COM	Alarm Relay COM	Junction box Alarm relay
		NO	Alarm Relay NO	Junction box Alarm relay
P8	CAN BUS	P	CAN Bus P	R5 RS422 Pin 25
		N	CAN Bus N	R5 RS422 Pin 26
P10	GPIO OUT	0	GPIO OUT 0	R5 I/O Pin 20
		1	GPIO OUT 1	R5 I/O Pin 22
		2	GPIO OUT 2	R5 I/O Pin 24
		3	GPIO OUT 3	R5 I/O Pin 25
		GND	GPIO OUT GND	R5 I/O Pin 3
P11	GPIO IN	0	GPIO IN 0	R5 I/O Pin 26
		1	GPIO IN 1	R5 I/O Pin 23
		2	GPIO IN 2	R5 I/O Pin 21
		3	GPIO IN 3	R5 I/O Pin 19
		GND	GPIO IN GND	R5 I/O Pin 3
P12	ECDIS	TX-A	ECDIS TX-A	R5 RS422 Pin 2



Item ¹	Terminal Marking	Pin Marking	Signal	Connects to
		TX-B	ECDIS TX-B	R5 RS422 Pin 1
		GND	ECDIS GND	R5 RS422 Pin 10
		RX-A	ECDIS RX-A	R5 RS422 Pin 12
		RX-B	ECDIS RX-B	R5 RS422 Pin 11
P13	R5 POWER	+	R5 Power +	Transponder R5 Power Cable Red
		-	R5 Power -	Transponder R5 Power Cable Black
		R	R5 Power R	Transponder R5 Power Cable Brown
		F	R5 Power F	Transponder R5 Power Cable Orange
P14	EXT SWITCH	F	Ext Switch F	Terminal R5 power F
		R	Ext Switch R	Terminal R5 power R
P15	SENSOR 1	TX-A	Sensor 1 TX-A	R5 I/O pin 2
		TX-B	Sensor 1 TX-B	R5 I/O pin 1
		GND	Sensor 1 GND	R5 RS422 Pin 13
		RX-A	Sensor 1 RX-A	R5 RS422 Pin 4
		RX-B	Sensor 1 RX-B	R5 RS422 Pin 3
P16	SENSOR 2	TX-A	Sensor 2 TX-A	R5 I/O pin 5
		TX-B	Sensor 2 TX-B	R5 I/O pin 6
		GND	Sensor 2 GND	R5 RS422 Pin 14
		RX-A	Sensor 2 RX-A	R5 RS422 Pin 6
		RX-B	Sensor 2 RX-B	R5 RS422 Pin 5
P17	SENSOR 3	TX-A	Sensor 3 TX-A	R5 I/O pin 7
		TX-B	Sensor 3 TX-B	R5 I/O pin 8
		GND	Sensor 3 GND	R5 RS422 Pin 23
		RX-A	Sensor 3 RX-A	R5 RS422 Pin 16
		RX-B	Sensor 3 RX-B	R5 RS422 Pin 15
P18	LONG RANGE	TX-A	Long Range TX-A	R5 RS422 Pin 18
		TX-B	Long Range TX-B	R5 RS422 Pin 17
		GND	Long Range GND	R5 RS422 Pin 9
		RX-A	Long Range RX-A	R5 RS422 Pin 8
		RX-B	Long Range RX-B	R5 RS422 Pin 7
P19	PILOT PORT	TX-A	Pilot Port TX-A	R5 I/O pin 17
		TX-B	Pilot Port TX-B	R5 I/O pin 18
		GND	Pilot Port GND	R5 I/O pin 4
		RX-A	Pilot Port RX-A	R5 I/O pin 15
		RX-B	Pilot Port RX-B	R5 I/O pin 16

Table 16 - Screw terminals



Below table details additional components in the Junctionbox

Item	Description
SW2	Termination Switches for ECDIS, Sensor 1, Sensor 2, Sensor 3, Long Range, CAN Bus and Pilot Port
SW1	Push-button for Software Load
P3	D-SUB Connector for R5 Signal Cable connected to transponder port RS422
P4	D-SUB Connector for R5 Signal Cable connected to transponder port I/O
P7	USB connector for Software Upgrade of Transponder
F1	5A fuse for AUX PWR
F2	5A fuse for R5 POWER

Table 17 - Additional Junction box components



15.3 CDU Interfaces:

15.3.1 CDU Back:



15.3.1.1 Ethernet port – RJ-45 100 MBit – IEC 61162-450

15.3.1.2 I/O port - 26-pole H.D.D-SUB Female

Only used in Combination with R4 Navigation Sensor installations.

15.3.1.3 GND Screw – M6

15.3.1.4 Power port

Pin	In/Out	Signal Name	Signal Type
1	In	PWR +	24 VDC
2	In	PWG GND	0 VDC



15.3.2 CDU Front hatch:



Figure 61- CDU Front ports

15.3.2.1 USB Host Type A
USB 2.0.

15.3.2.2 CDU Pilot Plug RS-422

This bi-directional port is routed over Ethernet to the Transponder.

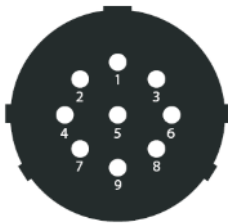


Figure 62 - CDU Pilot plug pin numbering

Pilot plug	Signal Type
PIN 9	RS-422 GND
PIN 1	RS-422 TX-A
PIN 5	RS-422 RX-A
PIN 4	RS-422 TX-B
PIN 6	RS-422 RX-B

Table 18 – CDU Pilot port signals

15.3.3 Secure Digital Card Reader



16 MECHANICAL DRAWINGS

16.1 Transponder Physical Size and Mechanical Drawing

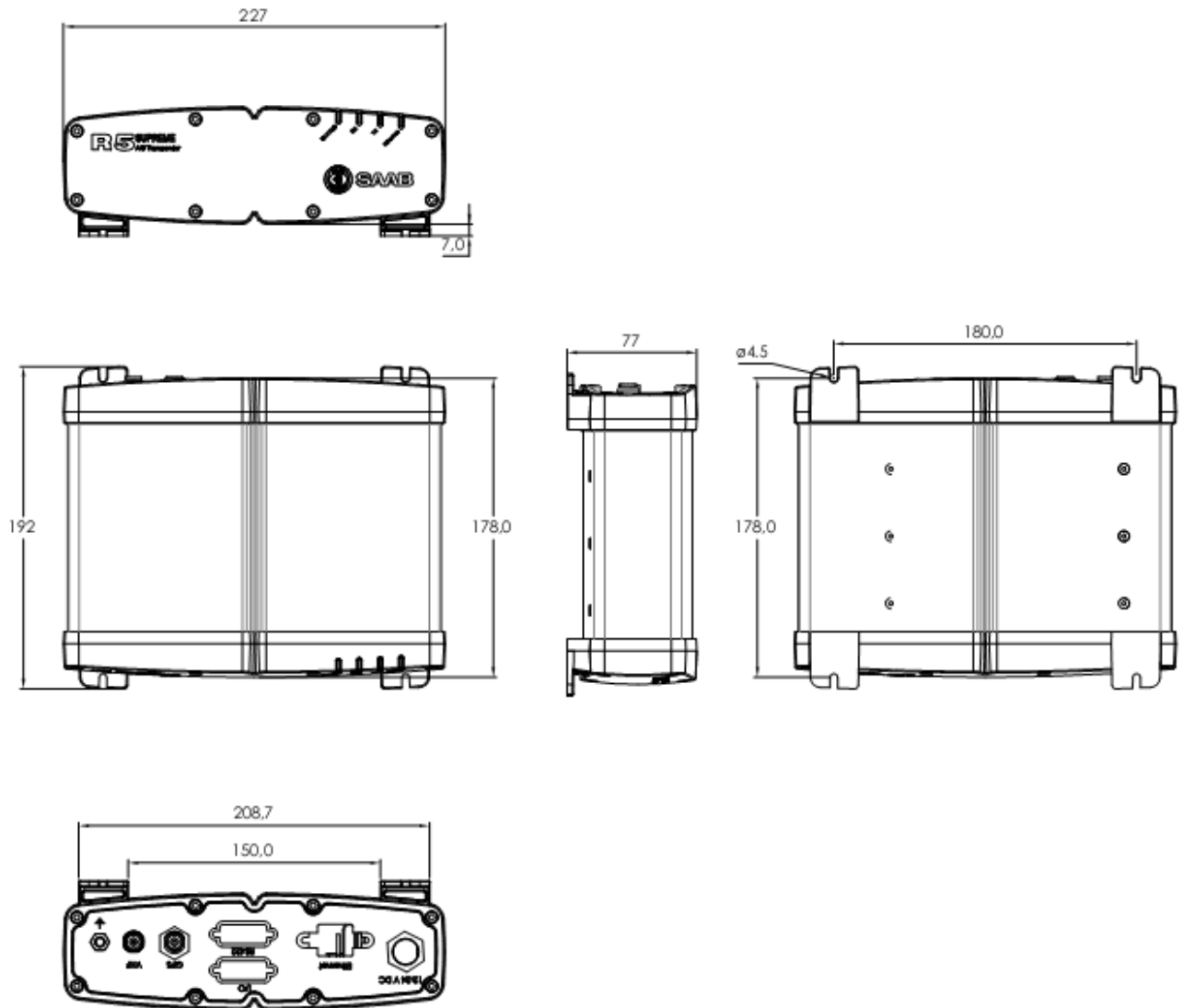


Figure 63 – R5 SUPREME Transponder, Dimensions



16.2 CDU Physical Size and Mechanical Drawing

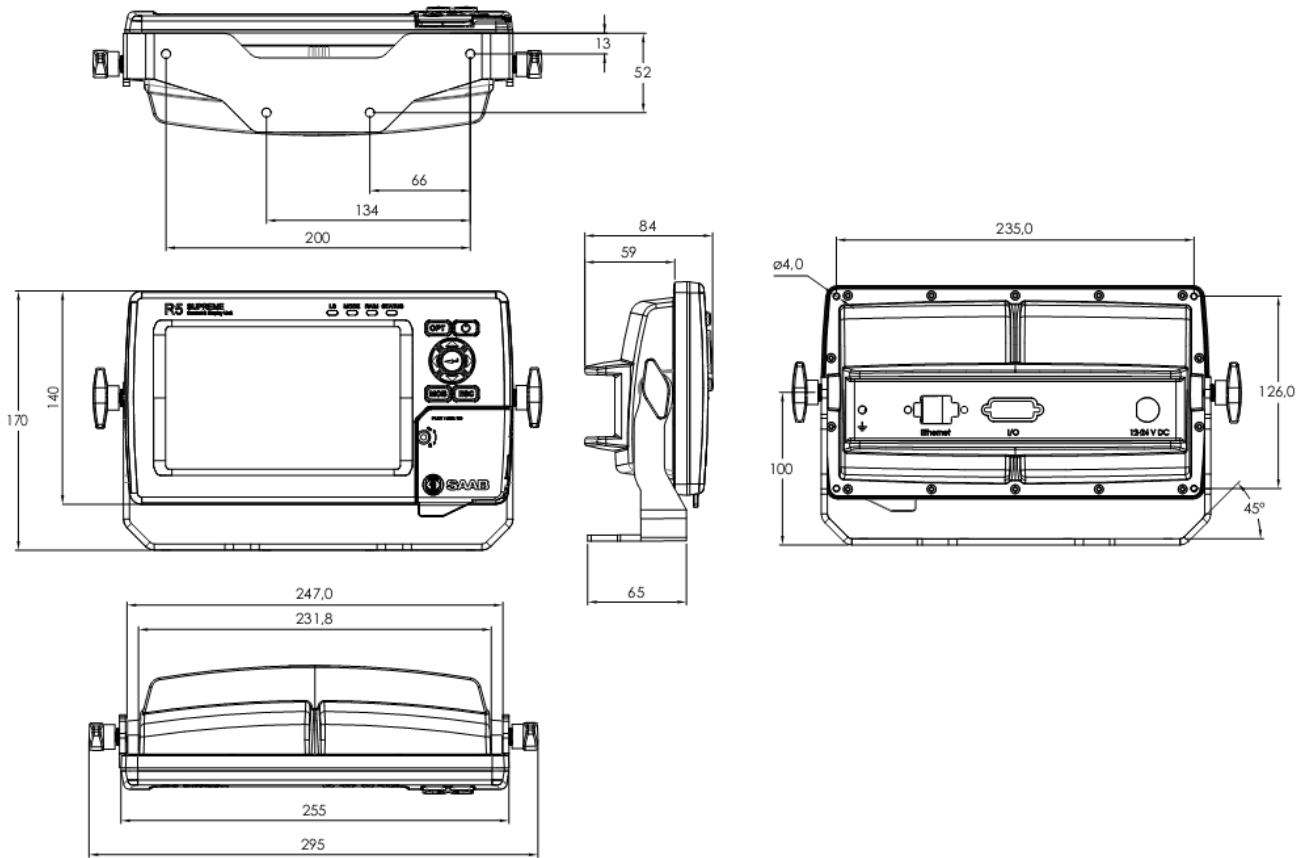


Figure 64 – R5 SUPREME CDU Mechanical Drawing (mm)



16.3 CDU Gimbal Mount Physical Size and Mechanical Drawing

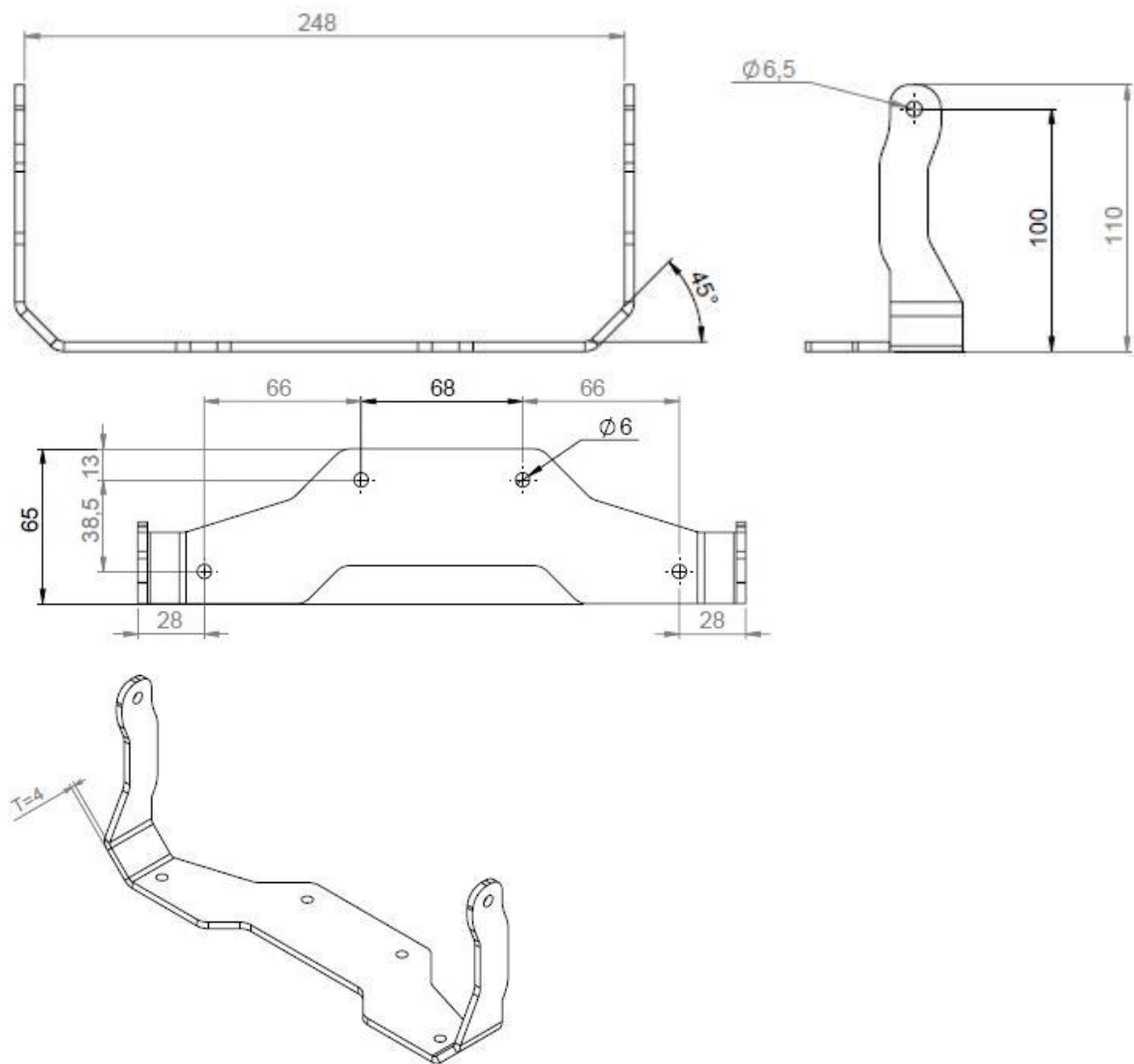


Figure 65 – R5 SUPREME CDU, Gimbal Mount



16.4 CDU Cutout Measurements for Panel Mount

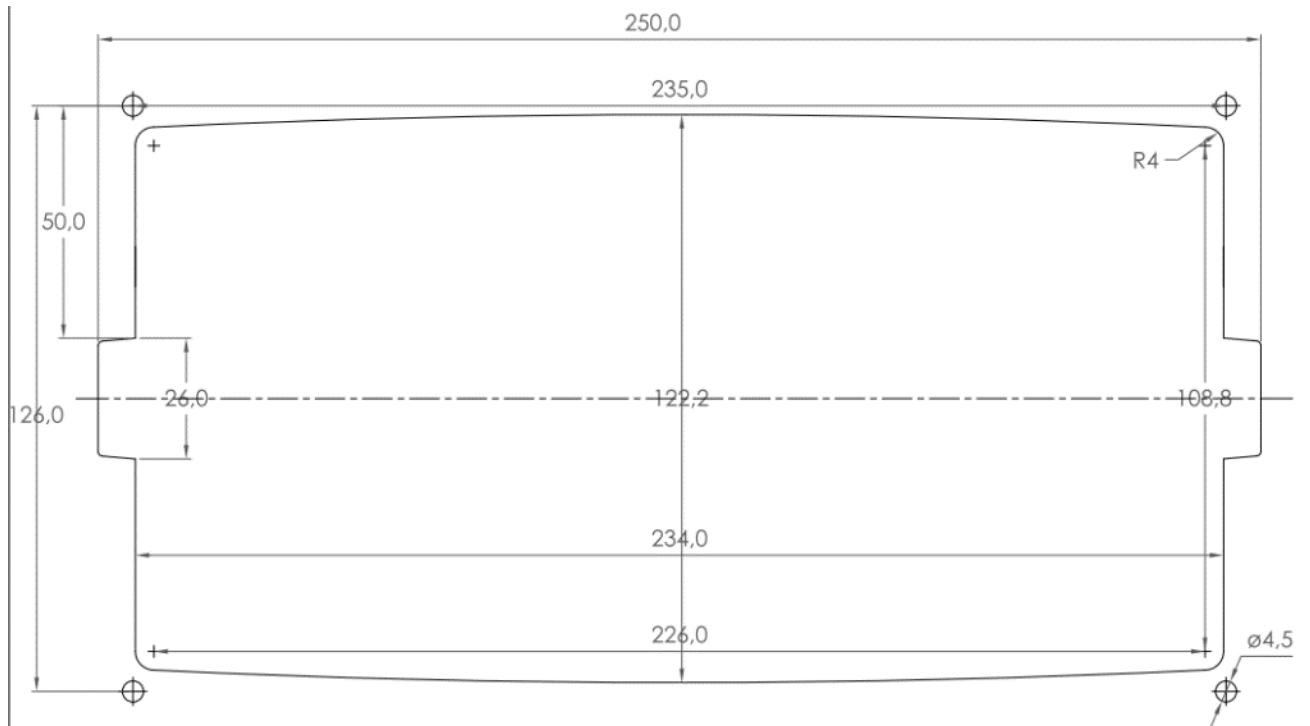


Figure 66 – R5 SUPREME CDU, Cutout Measurements for Panel Mount [mm]



16.5 CDU Mounting Frame cutout and dimensions

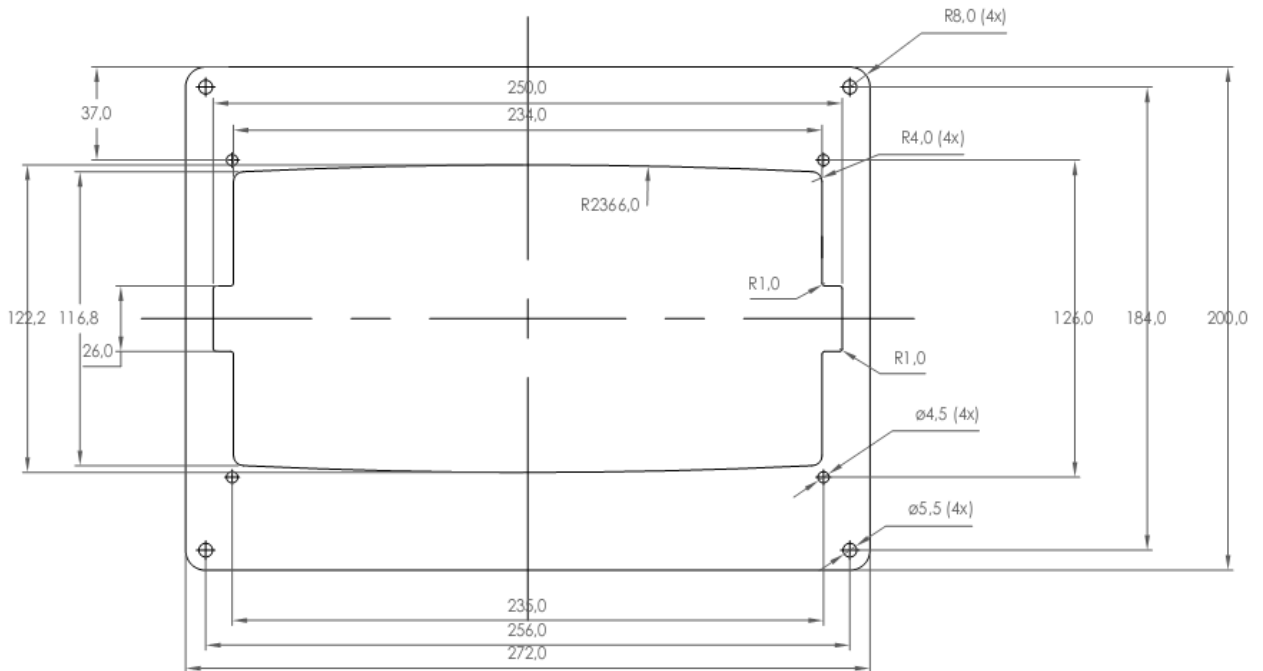


Figure 67 – R5 SUPREME CDU, Mounting frame dimensions

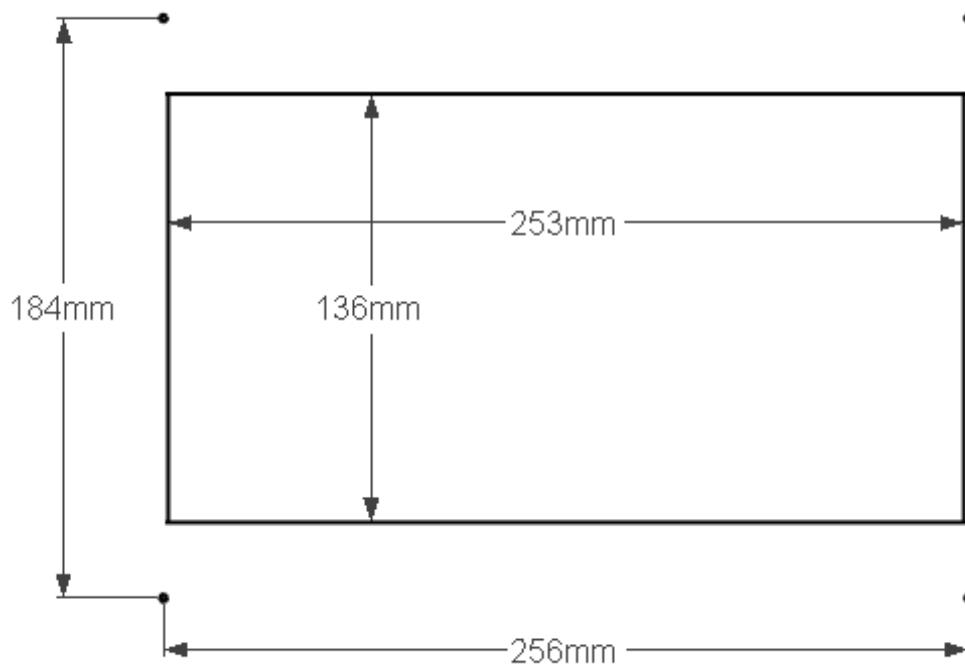


Figure 68 – R5 SUPREME CDU, Cutout Measurements for Panel Flush Mount (mm)



16.6 R5 AIS Junction Box Physical Size and Mechanical Drawing

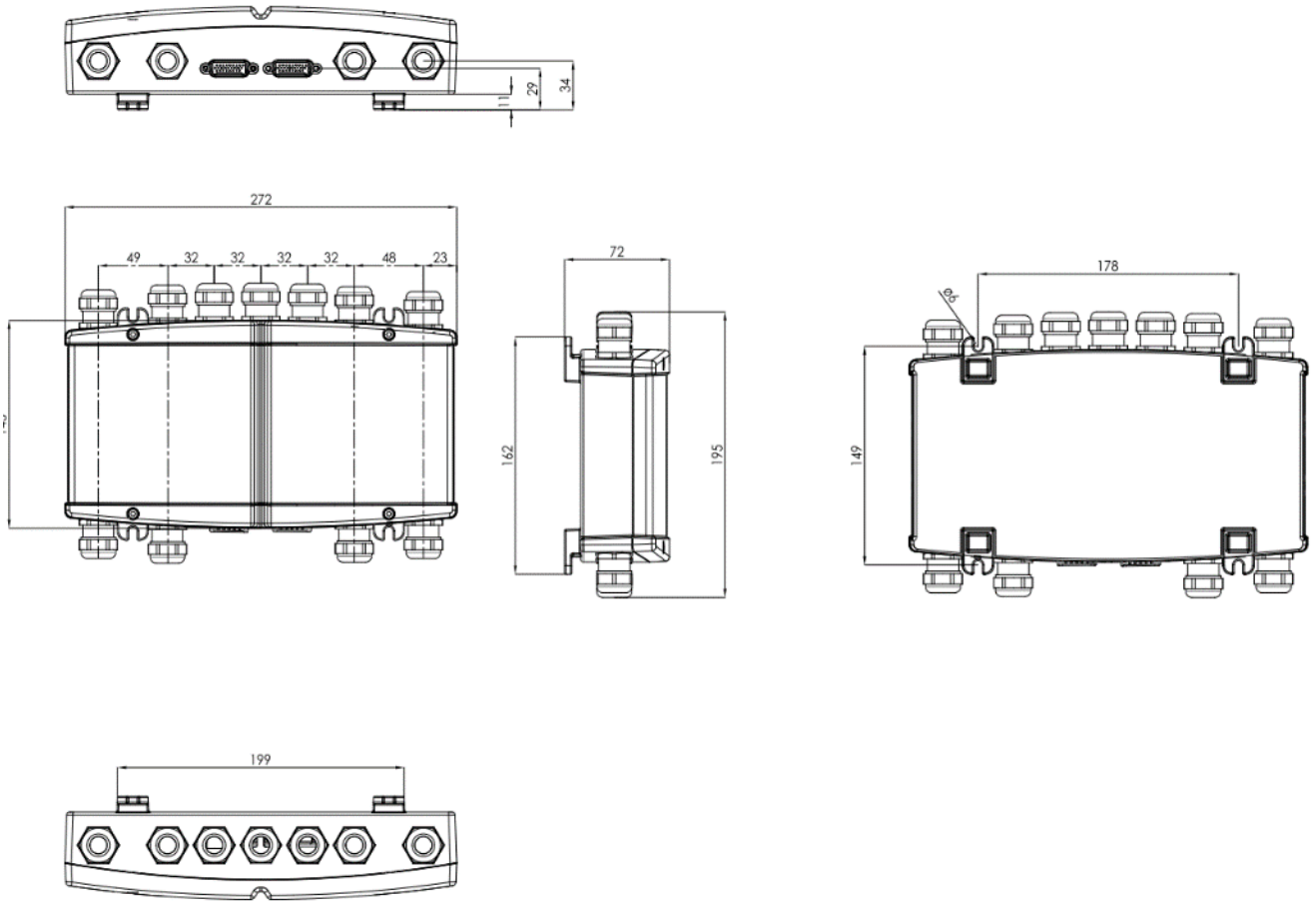


Figure 69 – R5 AIS Junction Box, Dimensions (mm)



16.7 GPS Antenna – Physical Size and Mechanical Drawing

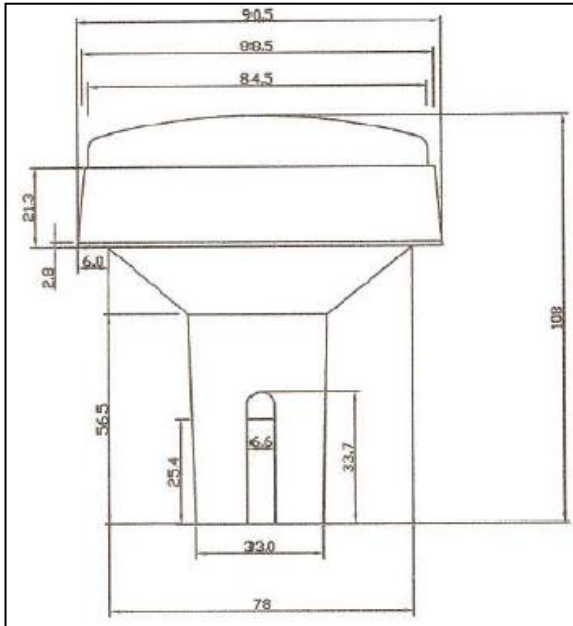


Figure 70 – GPS Antenna – MA700

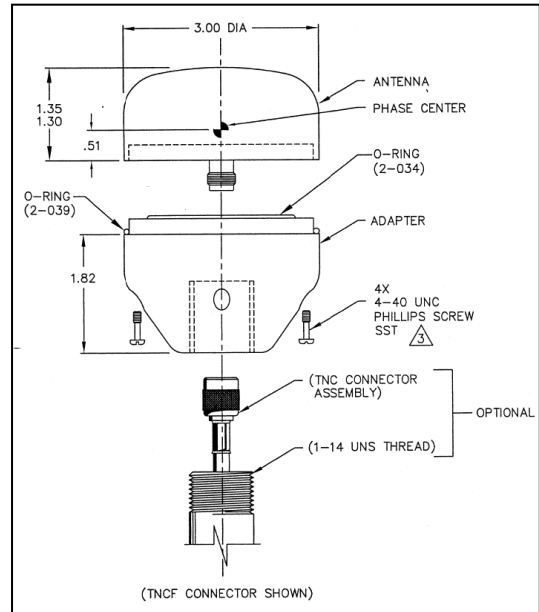


Figure 71 – GPS Antenna – AT575-68

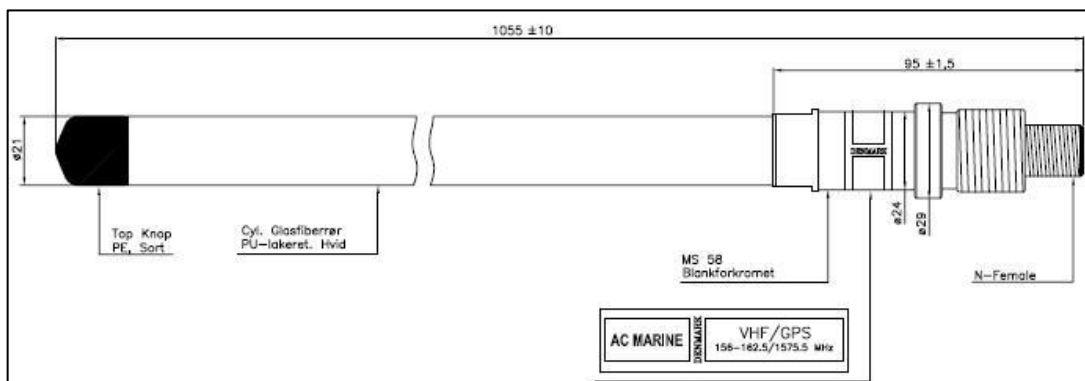


Figure 72 – Combined VHF / GPS Antenna – AC Marine

**17 GLOSSARY**

ACK	Acknowledgement
AFSK	Audio Frequency Shift Keying
AIS	Automatic Identification System
Ant	Antenna
App	Application
ARPA	Automatic Radar Plotting Aid
BRG	Bearing
BS	Base Station
CDU	Control and Display Unit
Ch	Channel
COG	Course Over Ground
Comm	Communication
DGNSS	Differential Global Navigational Satellite System
Disp	Display
DTE	Data Terminal Equipment
DSC	Digital Selective Calling
ECDIS	Electronic Chart Display and Information System
EGNOS	European Geostationary Navigation Overlay Service
EPFS	Electronic Position Fixing System
ETA	Estimated Time of Arrival
Ext	External
GALILEO	European GNSS
GLONASS	Russian GNSS
GMSK	Gaussian Minimum Shift Keying
GNSS	Global Navigational Satellite System
GPS	Global Positioning System
HDG	Heading
HDOP	Horizontal Dilution Of Precision
H/W	Hardware
IALA	International Association of Lighthouse Authorities
ID	Identifier
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
Int	Internal
IP	Internet Protocol (address)
ITU	International Telecommunications Union
LAT	Latitude



LED	Light Emitting Diode
LOC	Local
LON	Longitude
LR	Long Range
LWE	Light Weight Ethernet
Msg	Message
MKD	Minimum Keyboard and Display
MSAS	MTSAT Satellite Augmentation System (Japan)
NMEA	National Marine Electronics Association
MMSI	Maritime Mobile Service Identity
N/A	Not available
NE	North East
No	Number
NVM	Non-Volatile Memory
PoB	Persons on board
Pos	Position
RAIM	Receiver Autonomous Integrity Monitoring
RNG	Range
RATDMA	Random Access Time Division Multiple Access
ROT	Rate Of Turn
RTA	Recommended Time of Arrival
Rx	Receive
SAR	Search And Rescue
SART	Search And Rescue Transmitter
SBAS	Satellite Based Augmentation System
SNR	Signal to Noise Ratio
SOG	Speed Over Ground
SRM	Safety Related Message
Sync	Synchronization
SW	South West
S/W	Software
TDMA	Time Division Multiple Access
Transp	Transponder
Tx	Transmit
UN	United Nations
UTC	Universal Time Coordinated
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio. (A low value indicates a problem with the antenna or connections/cables to the antenna.)



WAAS	Wide Area Augmentation System (United States)
------	---

17.1 Units

bps	Bits per second
W	Watt
m	Meter
kHz	Kilo Hertz
dB-Hz	Decibel-Hertz
NM	Nautical Mile
km	Kilometer
Sm	Statute Mile
kn	Knots
km/h	Kilometer per Hour
mph	Miles per Hour
mm-dd hh:mm	month-day hour:minute
h:m:s	hours:minutes:seconds



18 APPENDIX A – LICENSE

The R5 SUPREME AIS Transponder System runs on a Linux operating system which is licensed with GNU General Public License. The source code of the Linux kernel can be obtained by contacting Saab AB (publ) TransponderTech:

Saab AB (publ), TransponderTech
Låsblecksgatan 3
589 41 Linköping
Sweden

Email: support.transpondertech@saabgroup.com

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Version 2, June 1991

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