

Tron AIS-SART

AIS Transmitter User Manual



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Abbreviations

AIS	Automatic Identification System
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
EIRP	Effective Isotropic Radiated Power
GHz	Gigahertz
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
ITU	International Telecommunication Union
LED	Light Emitting Diode
MED	EU Marine Equipment Directive
MHz	Megahertz
SART	Search and Rescue Transponder
SOLAS	Safety of Life at Sea (An international maritime safety treaty)
VHF	Very High Frequency

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3 General

Jotron manufactures safety products designed for the search and rescue of human lives and property. For this product to be effective according to the design parameters, it is imperative that it is handled, maintained, serviced and stowed in accordance with this manual.

All information contained within this manual has been verified and is to Jotron's knowledge correct. Jotron reserves the right to make changes to any product(s) or module(s) described herein to improve design, function or reliability, without further notice.



Jotron is not liable and cannot be held responsible for any injury or damages caused directly or indirectly by an error or omission of information, incorrect or misuse, breach of procedures or failure of any specific component or part of this product.

Jotron documentation can be downloaded from jotron.com.

4 Standards

Jotron declares that this this product is compliant in accordance with IMO, SOLAS and GMDSS regulations.

A copy of the declaration of conformity can be downloaded from jotron.com.

The Tron AIS-SART has been verified, tested, and meets the following product standards:

MED 96/98/EC as amended, 2011/75/EU (Annex 1/4.55)	Equipment authorization of products for the maritime industry.
IEC 61097-14:2010	GMDSS - part 14: AIS-SART - Operational and performance requirements, methods of testing and required test results.
IEC 60945:2002	Maritime navigations and radiocommunication equipment and systems - General requirements - Methods of testing and required test results.
IEC 60945 Corr.1:2008	Corrigendum 1 - Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results.
IEC 61108-1 Ed.2.0, 2003	Maritime navigation and radiocommunication equipment and systems - Global navigation satellite systems (GNSS) - Part 1: Global positioning system (GPS) - Receiver equipment - Performance standards, methods of testing and required test results.
IMO Resolution MSC.246 (83)	Performance standards for survival craft AIS-SART for use in search and rescue operations.

IMO Resolution MSC.247(83)	Performance standards for survival craft radar transponders for use in search and rescue operations.
IMO Resolution MSC.256(84)	International convention for the safety of life at sea. Includes: construction (structure and electronics), construction (fire protections, detections, and extinction), Life-saving appliances and arrangements and radiocommunications.
ITU-R M.1371-4 (2010)	Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band.
SOLAS (74 amended) Chapter IV/7.1.3	Radiocommunications.
SOLAS (74 amended) Chapter III Regulation 6.2.2	Communications - Search and rescue locating devices
SOLAS (74 amended) Chapter III Regulation 26. Additional requirements	This regulation applies to ro-ro passenger ships.
SOLAS (74 amended) Chapter IV, Regulation 7.1.3	Required radio communication equipment on mobile offshore units.

5 Product description

Tron AIS-SART is a battery powered AIS emergency transmitter in a sealed waterproof enclosure, which is watertight to a minimum depth of 1 meter. It is water, oil and sunlight resistant.

An AIS search and rescue transmitter is a location device. The purpose of the Tron AIS-SART is to assist a seafarer in distress during a search and rescue operation.

The Tron AIS-SART is designed for easy operation, it is buoyant and can withstand a drop of 20 meters into water. The detection range of the Tron AIS-SART is 7-10nm to a vessel AIS Class-A and more than 40 nautical miles from an airborne AIS receiver.

The Tron AIS-SART includes a built-in GPS, which aids in pinpointing the exact location of a seafarer that has evacuated to a lifeboat/liferaft. The signal from the Tron AIS-SART consists of a GPS position which is transmitted on VHF and received by an AIS receiver located on a search and rescue ship or helicopter.

The Tron AIS-SART includes the following components:

- Tron AIS-SART unit
- Mounting rope for lifeboats/liferafts
- Wall bracket



Figure 1 Tron AIS-SART

6 Functional description

Tron AIS-SART consists of a housing sealed at the lower end with a bottom lid. It may be split into the following main parts:

- Transmitter module
- Battery module
- Bottom lid
- LED indicator

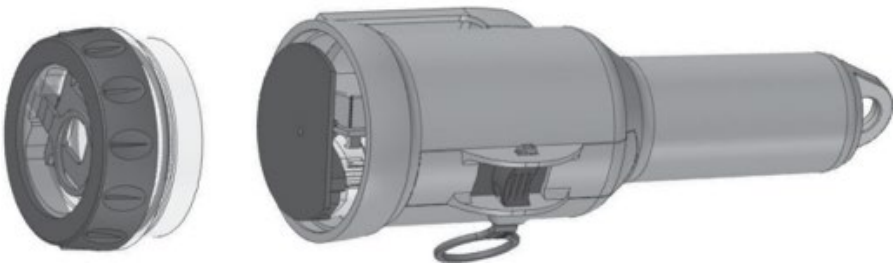


Figure 2 Illustration: Tron AIS-SART disassembled

6.1 Transmitter module

Tron AIS-SART transmitter module is inserted into the Tron AIS-SART housing. It consists of the main board, antenna and two screen boxes which is mounted in the housing. It can be divided into the following sections:

1. Transmitter module
2. Antenna
3. Screen boxes
4. Base of antenna

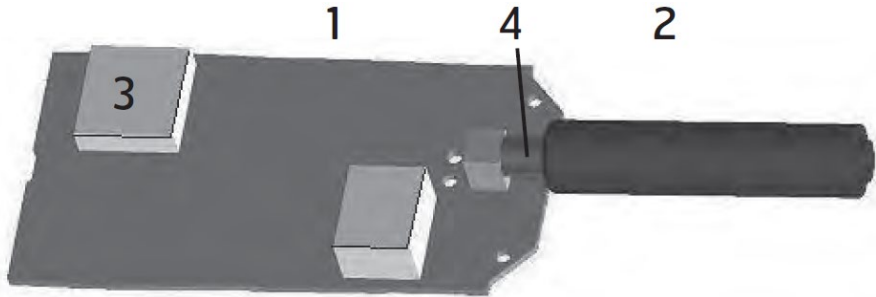


Figure 3 Illustration: Transmitter module

6.2 Battery module

The battery module consists of two C-size lithium batteries, a battery house and connector and cables. A battery expiry label on the Tron AIS-SART housing displays the expiry date. A new battery comes complete with cable and connector.

The battery module is inserted into the Tron AIS-SART housing. The battery label on the housing displays the battery expiry date.



Figure 4 Image: Tron AIS-SART battery label

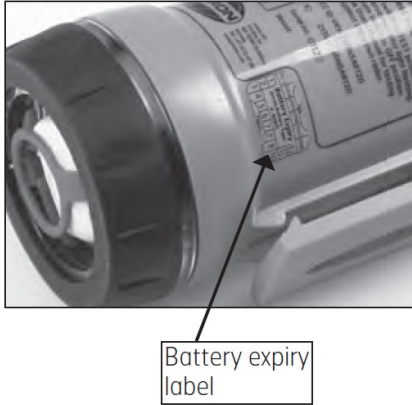


Figure 5 Illustration: Battery label on housing



The battery module is to be replaced every 5 years.



Only original Jotron batteries can be used with this product.

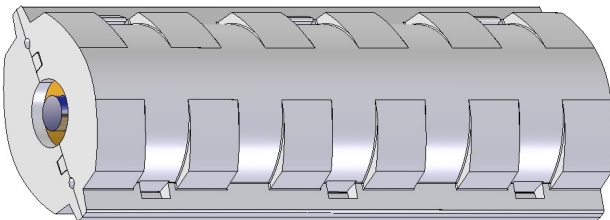


Figure 6 Illustration: Battery module (no cable or connector)

6.3 Bottom lid

The bottom lid includes four items:

1. Lanyard

2. Screen ring
3. Light tower
4. O-ring

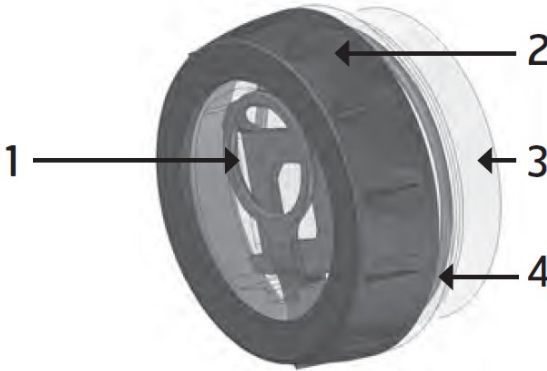


Figure 7 Illustration: Bottom lid

6.4 LED indicators

Tron AIS-SART is equipped with two coloured LED indicator lights, one green and one red. The LED indicators provide a visual status of the operation (active) and faults (errors). In addition, a built-in buzzer beeps regularly when in operation.

Description	Indicator	Buzzer
GPS position fix OK	Green LED ON (15 sec)	15 sec beep
Searching for GPS fix	Red and Green LED flashes	Regularly beep
No GPS fix, count number of flashes	Red LED ON (15 sec)	15 sec beep

Table 1 LED indicator functions

7 Installation

Tron AIS-SART can be mounted several ways near the emergency exit of the vessel. Normally, in the wheelhouse at the starboard or port exit (or both depending on the requirements) and inside a liferaft or lifeboat.

If the Tron AIS-SART is used in an emergency, it should be mounted vertically as high as possible to increase line of sight to the search and rescue units. Since the Tron AIS-SART has an integrated GPS receiver, it needs clear view to the sky to obtain GPS position.



Avoid having metal objects close to the unit, these will limit performance in the directions they are located.

7.1 Brackets

There are two different mounting brackets available.

- Wall bracket
- Lifeboat bracket (with or without a pipe clamp)

7.1.1 Mounting the wall bracket

A wall bracket is delivered with the Tron AIS-SART and should be used for storage of the unit.



The bracket should be mounted in a vertical position and placed where the Tron AIS-SART is easily available in the case of an emergency.

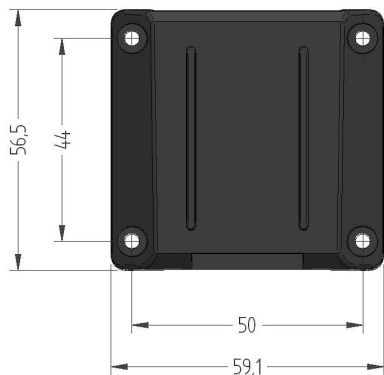


Figure 8 Illustration: Wall bracket dimensions

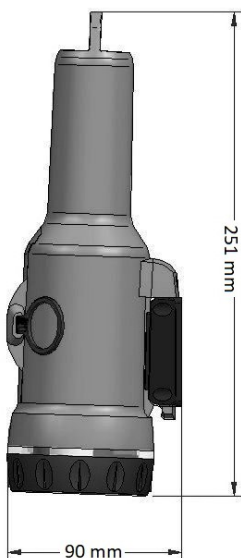


Figure 9 Illustration: Tron AIS-SART mounted in wall bracket

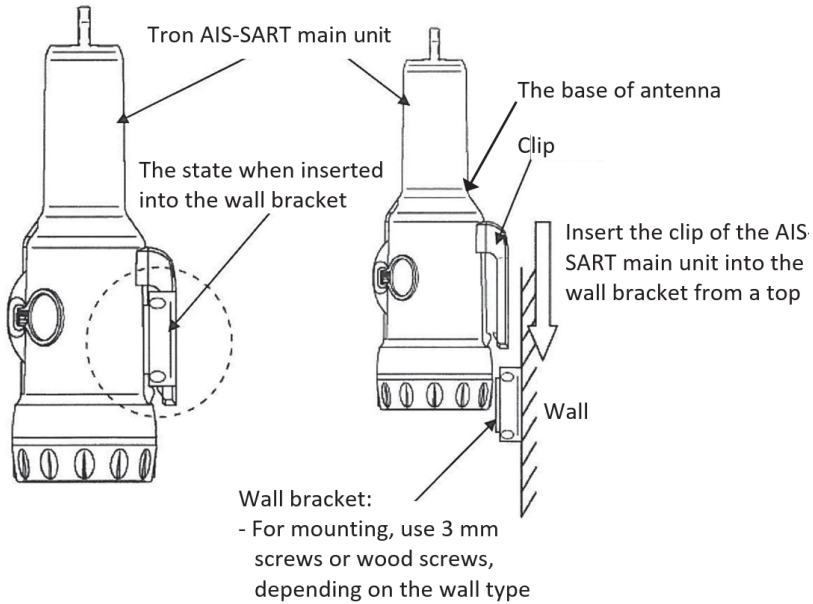


Figure 10 Illustration: Placement of AIS-SART in a wall mount

7.1.2 Mounting a lifeboat bracket

The lifeboat bracket should be mounted vertically and as high as possible on the roof of the lifeboat. This bracket can be mounted either on a wall or a pipe.



The Tron AIS-SART must not be permanently stored in this bracket if mounted outside a freefall lifeboat. Move the Tron AIS-SART to this bracket after the lifeboat is deployed in water.

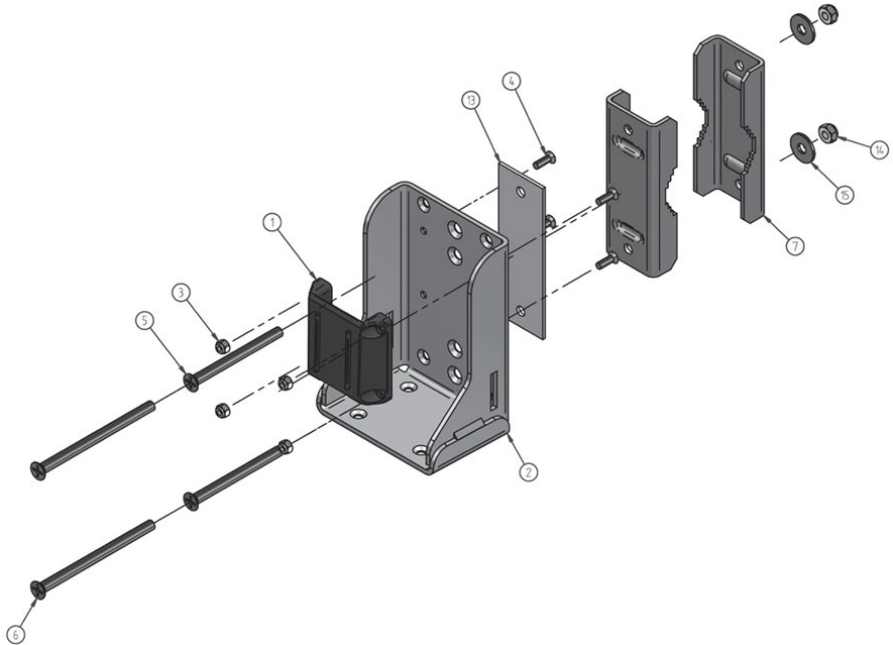


Figure 11 Illustration: Lifeboat bracket disassembled

Item no.	Document No.	Title
1	M-82746	Wall bracket
2	M-84163_VELDAMENT	M-84163_Bracket_Universal_Weldament D1
3	M-80312	Nut nylock M4 DIN 985
4	M-84676	Screw, DIN 965 – Pozidrive M4x12
5	M-84854	Screw, DIN 965 – Pozidrive M6x70
6	M-84855	Screw, DIN 965 – Pozidrive M6x90
7	M-84838	Pipe clamp
13	M-84875	Washer plate
14	M-91469	Nu nylock M6 DIN 985
15	M-82275	Washer, DIN 9021 – Ø6mm

Table 2 List of components - lifeboat bracket

Use the following dimensions when mounting the lifeboat bracket on a wall.

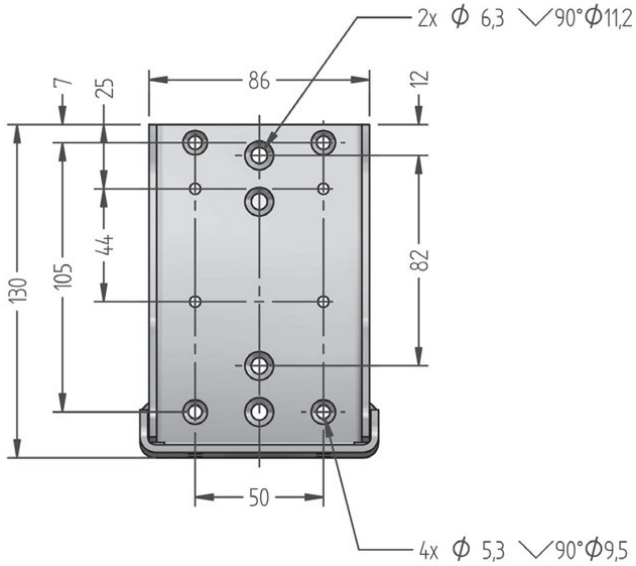


Figure 12 Illustration: Lifeboat bracket dimensions

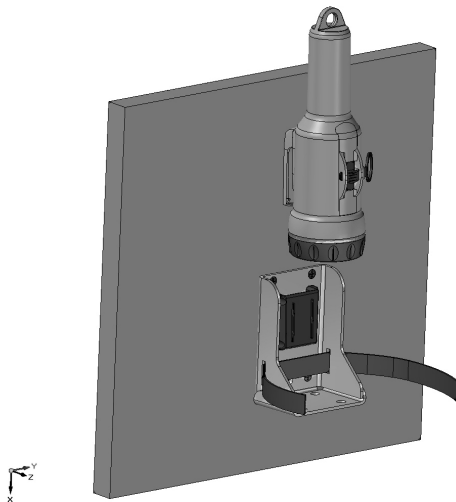


Figure 13 Illustration: Mounting - interior/external wall

The lifeboat bracket fits a pipe with a maximum diameter of 50mm.

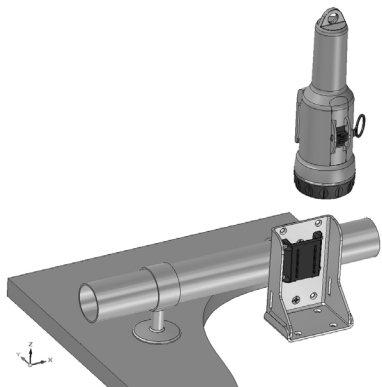


Figure 14 Illustration: Mounting on a pipe

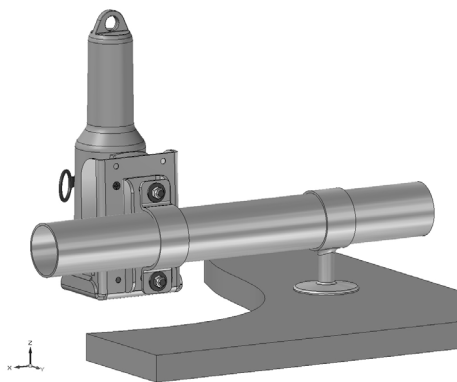


Figure 15 Illustration: Mounted ready on a pipe

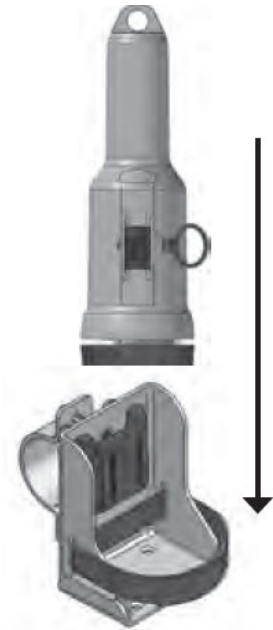


Figure 16 Illustration: Placing the Tron AIS-SART into the lifeboat bracket

7.2 Non bracket mounting options

A Tron AIS-SART can be mounted on a lifeboat/liferaft without a bracket in several ways, choose one of the following:

- Lanyard
- Liferaft mounting strap
- Telescopic pole

7.2.1 Mounting the lanyard

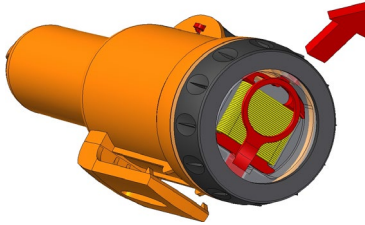
The lanyard can be used to hang the Tron AIS-SART inside a liferaft. Any objects that the lanyard can be attached to can be used. The lanyard is 10 meters in length.



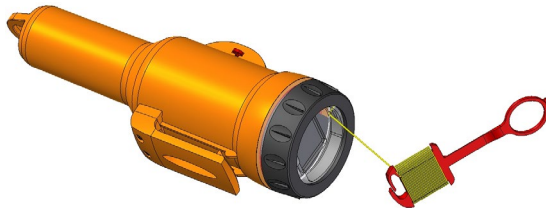
Keep the Tron AIS-SART away from any metal objects.

To use the lanyard, do the following:

1. Remove the lanyard.



2. Roll the lanyard out.



3. Thread the lanyard through the fastening ring on the top of the Tron AIS-SART.
4. Fasten the lanyard to the canopy.

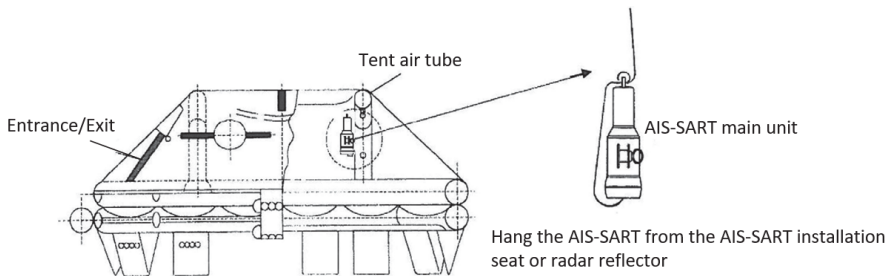


Figure 17 Illustration: using the lanyard on a lifeboat

7.2.2 Mounting the Liferaft mounting strap

The Liferaft mounting strap can also be used to attach the Tron AIS-SART to an inflatable canopy.

To use the Liferaft mounting strap, do the following:

1. Attach the strap to the fastening ring on the top of the Tron AIS-SART.
2. Fasten the other end of the strap to the canopy.



Figure 18 Image: Tron AIS-SART with Liferaft mounting strap attached

7.2.3 Mounting the telescopic pole

A telescopic pole can be used to extend the height of the Tron AIS-SART inside or outside the lifeboat/liferaft.



IMPORTANT

Ensure the rod is held as vertical as possible when activating the Tron AIS-SART.

To use the telescopic pole, do the following:

1. Attach the Tron AIS-SART to the pole.
2. Extend the pole to its full length and lock it in place.



NOTE

Make sure the pole is locked by pulling hard when it is fully extended. The pole can be fastened or held by a person.

3. Lift the Tron AIS-SART up through the tent air tube and secure it.



Figure 19 Illustration: Tron AIS-SART with telescopic pole attached

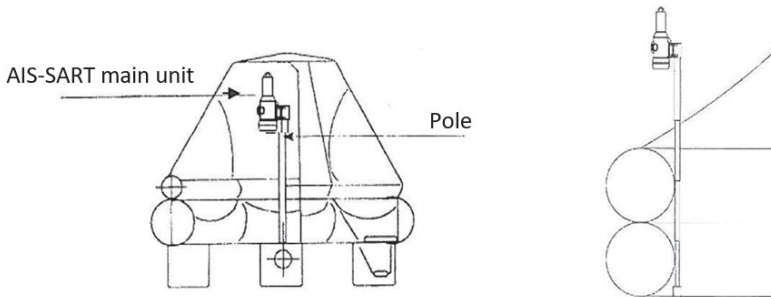


Figure 20 Illustration: using the telescopic pole on a lifeboat

7.3 Replacing the battery module

Below describes how to change the battery on the Tron AIS-SART.

7.3.1 Disassembly

To disassemble the battery module, do the following:

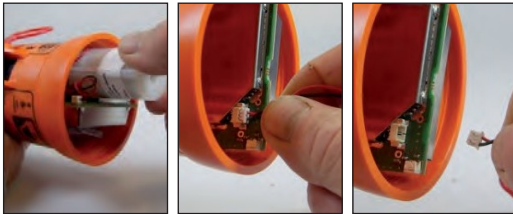
1. Twist the rubber grip anticlockwise to remove the lid. If difficult, remove the rubber holder over the lid and try again.



2. Once open set aside the rubber holder and lid (containing electronics), then look inside.



3. First, pull out the battery then pull out the cable from the connector.



4. Remove the two old 5gram silica gel bag.



7.3.2 Assembly

To assemble the battery module, do the following:

1. Install the new battery, verify the cable is within the guide.



2. Connect the cable to the electronics (black = left & red = right)



3. Add two new 5grams silica gel bags.



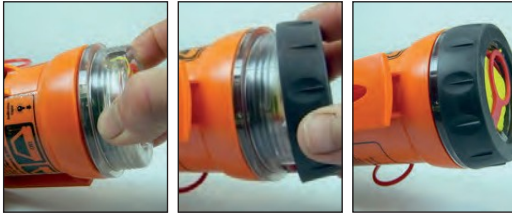
4. Mount the rubber holder.



5. Remove old O-ring (using for example a plastic card). Use Vaseline (acid free) and fit a new O-ring in place.



6. Reinstall the lid (tighten by hand), then replace the rubber holder.



8 Operating instructions

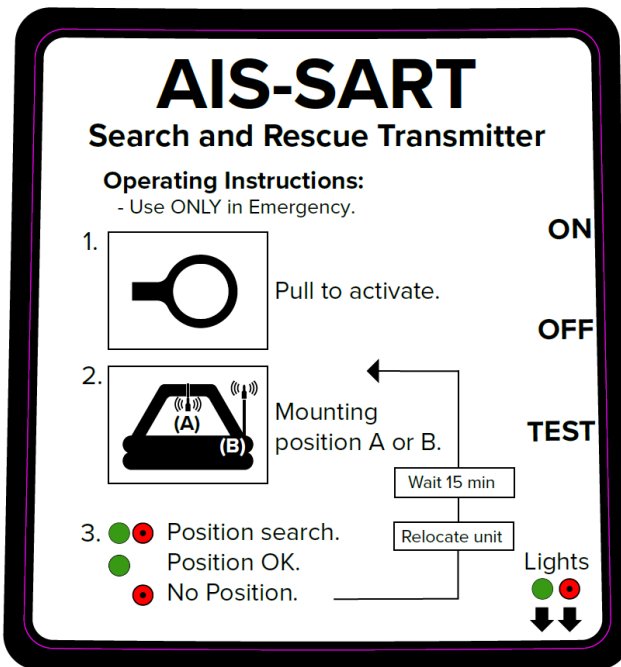


Figure 21 Image: Tron AIS-SART operating instructions label

The Tron AIS-SART should only be used in an emergency. The battery lasts for 96 hours from activation.



Replace the battery if the unit is used for any purpose other than a test.

8.1 Activation

1. Pull the activation ring to activate.
2. Ensure the switch enters the ON position.



NOTE

The LED indicator starts to flash and the unit beep regularly.

3. Secure the Tron AIS-SART to the lifeboat/liferaft in a vertical position and as high as possible.
4. Both LEDs (green & red) will flash while the unit is searching to fix a GPS position (max. 15 mins).

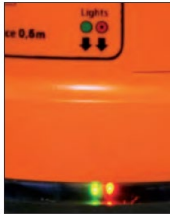


Figure 22 Image: LEDs ON

5. You will hear a beep every time a transmission is made (every min).
6. When a successful GPS position has been fixed, the green LED flashes.

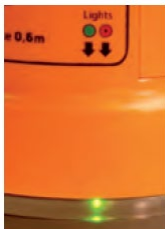


Figure 23 Image: Green LED

7. If no GPS position is fixed, it is indicated by a red LED flash. When this happens, reposition and restart the unit.

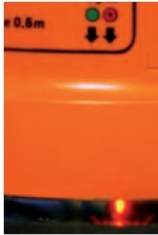


Figure 24 Image: Red LED



NOTE

When the green LED is flashing, the unit will update its GPS position every minute, transmitting the position to nearby ships and aircraft.

8.2 Deactivation

1. Move the switch to the OFF position.
2. Replace the activation ring.

8.3 Active reception on nearby vessels, AIS transponders and ECS/ECDIS or chart plotters

Some AIS transponders are not compliant with AIS-SART, but will still receive them as another ship, both with ID code, position, range, bearing and text message.

8.3.1 Reception - non AIS-SART compliant transponder

This type of AIS transponder will appear as a vessel without a name, but with MMSI (ID code), range, bearing and position. In addition, a text message stating SART ACTIVE will also be received.

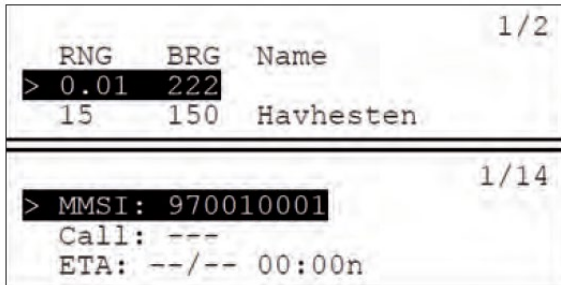


Figure 25 Image: Display - Non-compliant AIS transponder



Figure 26 Image: Text message display - Non-compliant AIS transponder

8.3.2 Reception - non AIS-SART compliant (ECS/ECDIS)

This will be shown as a ship. The same text message will be received stating: SART ACTIVE.



Figure 27 Image: Display - ECS/ECDIS

8.3.3 Reception - AIS-SART compliant transponder

By default, the target list is auto sorted in ascending order except the nearest active AIS SART or if supported, other target of interest shall be displayed at the top of the list.

The text SART ACTIVE appears as the vessel name showing range, bearing and position. In addition, a text message stating SART ACTIVE will also be received.

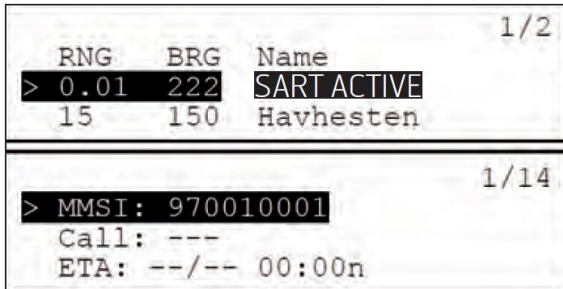


Figure 28 Image: Display - Compliant AIS transponder



Figure 29 Image: Text message display - Compliant AIS transponder

8.3.4 Reception - AIS-SART compliant (ECS/ECDIS)

Although the AIS transponder is not AIS-SART compliant, the electronic chart may show the correct symbol when receiving an AIS-SART in TEST or ACTIVE if it is updated to the latest revisions defined below:

A special symbol (RED) (ref. SN.1/Circ.243/add.1 and in the latest revision of IEC 62388)

An AIS search and rescue transponder is represented by a circle with an X. The diameter of the circle is 5mm. The symbol shall be drawn using a thick dashed line style (RED) The symbol will flash until acknowledged by the user. Once acknowledged, the symbol shall cease flashing.

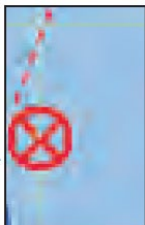


Figure 30 Image: Display - Electronic chart - Red symbol and dashed line

A text message stating SART ACTIVE will also be received.

9 Maintenance

The Tron AIS-SART requires the following maintenance:

Timing	Requirements
Every month	Both the unit and the bracket should be inspected. The unit should be removed from the bracket and tested. Perform inspection and testing following the steps outlines in this manual.
Every 6 months	Both the unit and the bracket should be inspected. The unit should be removed from the bracket and tested. Perform inspection and testing following the steps outlines in this manual.
Every 5 years	Storage of a battery over a long period of time will reduce its capacity. To ensure long and reliable operation the battery unit must be replaced every 5 years. Battery replacement can be performed on board.

Table 3 Maintenance requirements

9.1 Testing

Although the Tron AIS-SART does not send an alarm via satellite, VHF or other radio communication, usage should be limited to short tests. This ensures the best battery capacity available for a potential emergency.

Do the following steps to test the Tron AIS-SART:



IMPORTANT

The test must be conducted outdoors with a clear view to the sky to maximize the GPS location.

1. Move the switch to the TEST position and hold.





The Tron AIS-SART will now run through a self-test procedure. If a RED LED flashes, it indicates a critical fault. Refer to the error codes for more information.

2. Release the switch when both LEDs start flashing. The unit will now search for the GPS position. It will only search for 15 minutes max.



Figure 31 Image: LEDs ON

3. A successful test is indicated by a 15 sec BEEP and a GREEN LED.



Refer to AIS transponder/Electronic chart for additional description information.

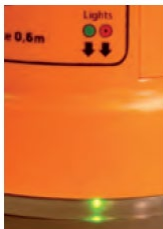


Figure 32 Image: Green LED

4. An unsuccessful test is indicated by a 15 sec BEEP and a RED LED. If this should happen, relocate the unit, and restart the test.



Figure 33 Image: Red LED

5. To cancel an ongoing test, hold the switch in the TEST position until the buzzer starts to beep.

9.2 Error codes (red flash during testing)

If the self-test detects a fault during testing, one or more of the following indications are shown:

Number of LED flashes	Error codes
2	Transmit power failure
3	Low battery
4	Transmit frequency error
5	User ID not programmed
6	Undefined, contact Jotron
7	Internal communication error

Table 4 Tron AIS-SART error code descriptions – red flash during testing



NOTE

Test procedure instructions are also indicated on the product label.

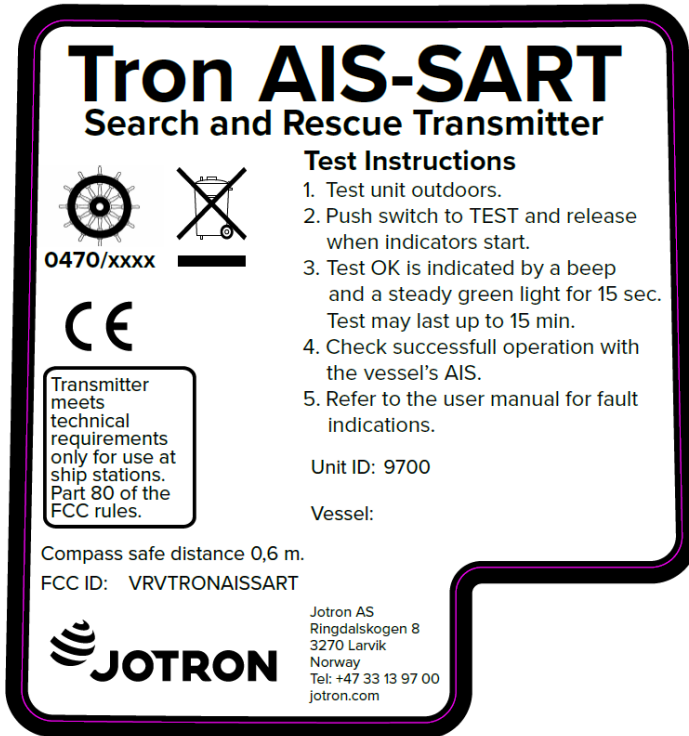


Figure 34 Image: Tron AIS-SART - Test instruction label

9.3 Test reception on nearby vessels, AIS transponders and ECS/ECDIS or chat plotters

To conduct a complete test of a Tron AIS-SART, reception on the ships AIS transponder should also be checked. Some AIS transponders are not compliant with AIS-SART, but will still receive them as another ship, both with ID code, position, range, bearing and text message.

9.3.1 Reception on a non AIS-SART compliant AIS transponder

This type of AIS transponder will appear as a vessel without a name, but with MMSI (ID code), range, bearing and position. In addition, a text message will be received.

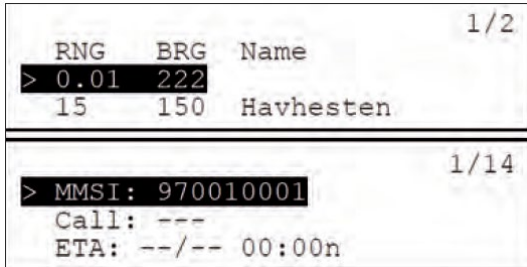


Figure 35 Image: Display - Non-compliant AIS transponder

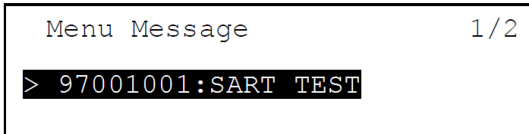


Figure 36 Image: Text message display - Non-compliant AIS transponder

9.3.2 Reception on a non AIS-SART compliant electronic chart (ECS/ECDIS)

This will be shown as a ship. The same text message will be received stating: SART ACTIVE.



Figure 37 Image: Display - ECS/ECDIS

9.3.3 Reception on an AIS-SART compliant AIS transponder

The reception/visibility requirement on an AIS-SART compliant transponder is as follows:

There shall be a separate menu item in the AIS to activate reception of the AIS-SART in TEST.

Jotron TR-8000:



Advanced - VHF Link/Long range – Display SART in test mode

Furuno FA-150 implementation – USER SETTINGS – DISP SART TEST = ON

When this function is activated:

AIS-SART will be shown on top of the list with the vessel name SART TEST since this is an emergency product to show ships/people in distress (Normally, this list is sorted, but AIS-SART has higher priority than normal vessels).

AIS-SART will be show with ID code, range, bearing and position. In addition, a text message will be received.

RNG	BRG	Name	1/2
> 0.01	222	SART TEST	
15	150	Havhesten	

		1/14
>	MMSI: 970010001	
	Call: ---	
	ETA: --/-- 00:00n	

Figure 38 Image: Display - Compliant AIS transponder

9.3.4 Reception on an AIS-SART compliant electronic chart (ECS/ECDIS)

Although the AIS transponder is not AIS-SART compliant, the electronic chart may show the correct symbol when receiving an AIS-SART in TEST or ACTIVE if it is updated to the latest revisions defined below:

A special symbol (RED) (ref. SN.1/Circ.243/add.1 and in the latest revision of IEC 62388)

An AIS search and rescue transponder is represented by a circle with an X. The diameter of the circle is 5mm. The symbol shall be drawn using a thick dashed line style (RED) The symbol will flash until acknowledged by the user. Once acknowledged, the symbol shall cease flashing.



Figure 39 Image: Display - Electronic chart - Red symbol and dashed line

A text message stating SART TEST will also be received.

10 Test and maintenance records

Below is an overview of all test and control details.

Date	B/T*	Signature	Inspector name

*B=New battery, T=Test

11 Battery safety information

Manufacturer name:	Primary lithium metal
Volts:	3.6V/cell
Approximate weight:	51grams/cell
Chemical system:	Primary lithium-thionyl chloride
Designated for recharge:	No

For information regarding the physical and chemical properties, the potential health and safety measures and the environmental effects of the battery used with this product, refer to the manufacturer's safety information documentation.

The safety information is available for download at jotron.com - product. http://jotron.com/product/tron-ais-sart/.

11.1 Handling and storage

This product should be stored in a cool and well-ventilated area. Elevated temperatures can result in a reduction of battery life. Locations that handle large quantities of lithium batteries must ensure the batteries are isolated from combustibles. A short circuit for a few seconds will not seriously affect the battery. A prolonged short circuit will cause the battery to lose energy, generate significant heat and can cause the safety release vent to open. The contents of an open battery, including a vented battery, when exposed to water, may result in a fire and/or explosion. Crushed or damaged batteries may result in a fire. A battery that is disassembled or exposed to water, fire or high temperatures can explode or leak causing burns.

11.1.1 Transportation

The product described in this manual is subject to follow special packing instructions and/or transportation regulations. Information regarding these regulations (in accordance with ICAO/IATA, IMDG code and/or ADR/RID) is included in the product safety information (PSI) and/or in the test summary report (TSR) (in accordance with UN test 38.3.5) and available for download at jotron.com - product. http://Jotron.com/product/tron-ais-sart/.

12 Technical specifications

12.1 Product specification

Battery type:	Primary lithium-thionyl chloride
Battery capacity:	7.2V/3.6Ah at -20°C
Battery service life:	5 years
Materials:	
Housing:	Glass reinforced polycarbonate
Light cover:	Polycarbonate
Impact ring:	Thermo plastic elastomer
Unit dimensions (H/W/D):	251mm x 89mm x 89mm
Weight:	450grams
Temperature operating:	-20°C to +55°C (-4°F to +131°F)
Temperature storage:	-30°C to +70°C (-22°F to +158°F)
Operating life:	96 hours continuous operation at -20°C.
Lanyard length:	10meters
Lanyard strength:	>25kg

12.2 Radio transmitter

Frequency:	161.975MHz and 162.025MHz
Radiated power (EIRP):	1W (30dBm ± 3dB)
Antenna pattern:	Vertical polarization

12.3 Brackets

12.3.1 Wall bracket

Materials:	ASA (acrylonitrile styrene acrylate)
Bracket (incl. unit) (H/W/D):	250mm x 89mm x 90mm
Weight:	20grams

12.3.2 Lifeboat bracket

Materials:	Anodized aluminum
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Dimensions (H/W/D):	130mm x 86mm x 90mm
Weight:	560grams
Release mechanism:	Jotron HRU

13 Optional accessories

For an overview of the available optional accessories for this product, refer to jotron.com.

14 Spare parts

For an overview of the available spare parts for this product, refer to jotron.com.

14.1 Counterfeit spare parts

Ensure that all spare parts being fitted to this product are only original spare parts manufactured or approved by Jotron.

Any use counterfeit parts will invalidate the product type-approval certificate.

15 Recycling and disposal

This product should not be disposed as normal waste and must be handled in accordance with the applicable federal, state and local waste disposal regulations in the country where the equipment is used.

16 Warranty

All Jotron products are warranted against factory defects in materials and/or workmanship during the warranty period. Refer to the sales terms and conditions for specific warranty information regarding this product.

17 Service

All services such as testing, installation, programming, replacement, marking and battery exchange are provided by an authorized Jotron service agent.

Improper service or maintenance may destroy the functionality and/or performance of this product.

Jotron does not accept any responsibility for the dismantling or reassembling of any Jotron product that occurs externally from a Jotron authorized facility and/or is handled by someone other than an authorized, trained and certified person.

17.1 Service agents

Refer to jotron.com for an overview of Jotron partners and distributors.

<https://jotron.com/partners-and-distributors/>

18 Document revision log

Document revision log			
Rev	Date	Reason for Issue	Author
A	16.06.09	New product (28 pages)	ES
B	22.11.09	New information (page 2)	ES
C	08.12.09	Updated information (pages 22-27)	FIT
D	22.03.10	Updated information (30 pages)	FIT
E	21.04.10	Updated information (34 pages)	FIT
F	10.06.10	Updated information (page 28)	FIT
G	29.08.12	Updated information (36 pages)	FIT
H	21.12.21	Updated content, revised text structure and and new documentation design and layout in accordance with new company profile.	WB



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