Tron SART20

Radar Transponder

User manual

JOTRON
Performance for Life

Document revision log				
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Rev	**Date**	**Reason for Issue**	**Author**	**Checked**

Table of Contents

1 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.

Important! Jotron is not liable and cannot be held responsible for any injury or damage 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.

1.1 Abbreviatons

EIRP	Effective Isotropic Radiated Power
GHz	Gigahertz
GMDSS	Global Maritime Distress and Safety System
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
ITU	International Telecommunication Union
LED	Light Emitting Diode
MED	EU Marine Equipment Directive
NM	Nautical mile
SART	Search and Rescue Transponder
SOLAS	Safety of Life at Sea (An international maritime safety treaty)
VHF	Very High Frequency

2 Standards

Jotron declares that 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 SART20 has been verified, tested and meets the following product standards:

Commission Directive 2009/26/EC	Testing standards for international instruments, lifesaving marine equipment.
COMSAR/Circ. 32 (Aug. 2004)	Harmonization of GMDSS requirements for radio installations on board SOLAS ships.
IEC 61097-1:1992 (withdrawn)	Global maritime distress and safety system (GMDSS) - Part 1: Radar transponder - Marine search and rescue (SART) - Operational and performance requirements, methods of testing and required test results.
IEC 61097-1:2007	Global maritime distress and safety system (GMDSS) - Part 1: Radar transponder - Marine search and rescue (SART) - Operational and performance requirements, methods of testing and required test results.
IEC 60945-4:2002	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results.

IMO Resolution MSC.97 (73) 14.7.1.3	International code of safety for high-speed craft (2000) (Instructions for the guidance of surveyors).
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.
IMO Resolution - A.530 (13)	Use of radar transponders for search and rescue purposes.
IMO Resolution - A.802 (19)	Performance Standards for Survival Craft Radar Transponders for Use in Search and Rescue Operations.
IMO Resolution - A.694 (17)	General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigation aids.
ITU-R M.628-3 (11/93)	Technical characteristics for search and rescue radar transponders.
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.

3 Product description

The Tron SART20 is a 9 GHz radar transponder in a sealed waterproof and buoyant enclosure. It is water, oil and sunlight resistant. The Tron SART20 is designed for easy operation and can withstand a drop of 20 meters into water.

A radar transponder is a location device. The purpose of the Tron SART20 is to assist a seafarer in distress during a search and rescue operation.

When the Tron SART20 is interrogated by a radar signal, it will immediately start to transmit several sweeps covering the complete maritime 3 cm radar band. The sweeps are used to navigate directly towards the Tron SART20 located on a lifeboat/life raft.

A radar transponder should respond when interrogated by a shipborne X-band radar with a scanner height of 15 m within 8 NM. The Tron SART20 will also respond when interrogated by a compatible X-band radar fitted to an aircraft operating at a height of 3000 feet at a distance of at least 30 NM.

Tron SART20 includes the following components:

- Tron SART20 unit
- Mounting rope for lifeboat/life raft
- Wall bracket

Figure 1 Tron SART20

4 Functional description

Tron SART20 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

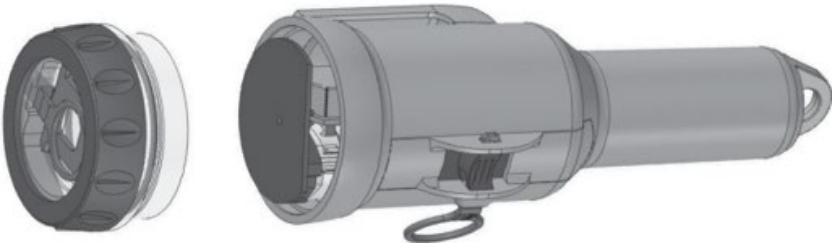


Figure 2 Illustration: Tron SART20 disassembled

4.1 Transmitter module

Tron SART20 transmitter module is inserted into the Tron SART20 housing. It consists of the transceiver board and antenna. It can be divided into the following sections:

- Transceiver board in metal box
- Antenna

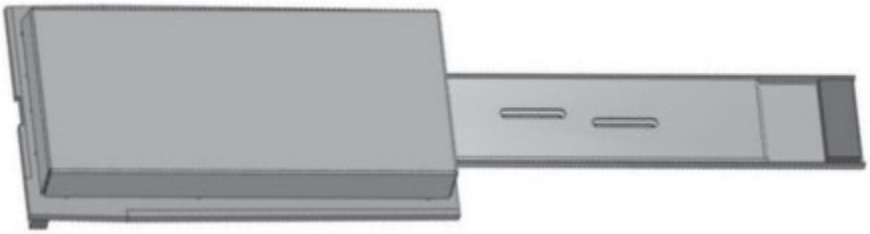


Figure 3 Illustration: Transmitter module

4.2 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 SART20 housing displays the expiry date. A new battery comes complete with cable and connector.

The battery module is inserted into the Tron SART20 housing. The battery label on the housing displays the battery expiry date.

Figure 4 Image: Tron SART20 battery label

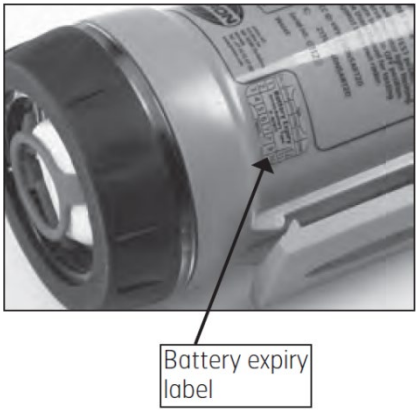


Figure 5 Illustration: Battery label on housing

Important! The battery module is to be replaced every 5 years.

Caution! Only original Jotron batteries can be used with this product.

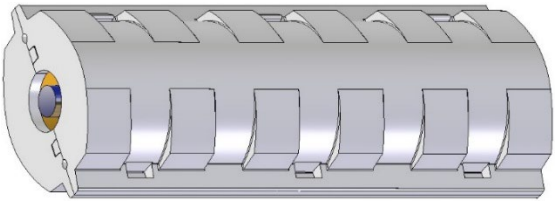


Figure 6 Illustration: Battery module (no cable or connector)

4.3 Bottom lid

The bottom lid includes four items:

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

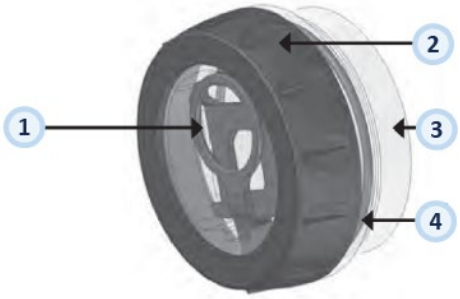


Figure 7 Illustration: Bottom lid

5 Installation

Tron SART20 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 lifeboat/life raft.

5.1 Brackets

There are two different mounting brackets available:

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

5.1.1 Mounting the wall bracket

A wall bracket is delivered with the Tron SART20 and should be used for storage of the unit.

Important! The bracket should be mounted in a vertical position and placed where the Tron SART20 is easily available in case of an emergency.

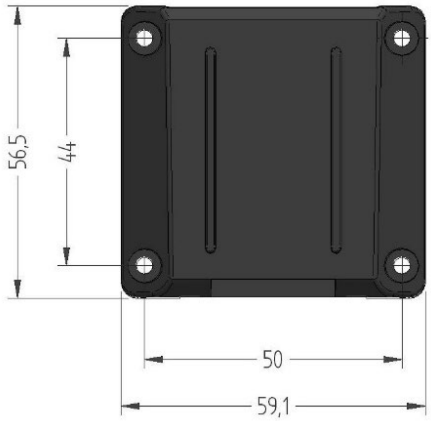


Figure 8 Illustration: Wall bracket dimensions

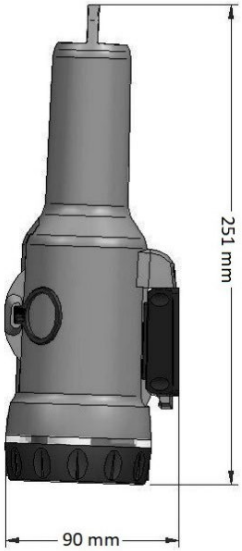


Figure 9 Illustration: Tron SART20 mounted in wall bracket

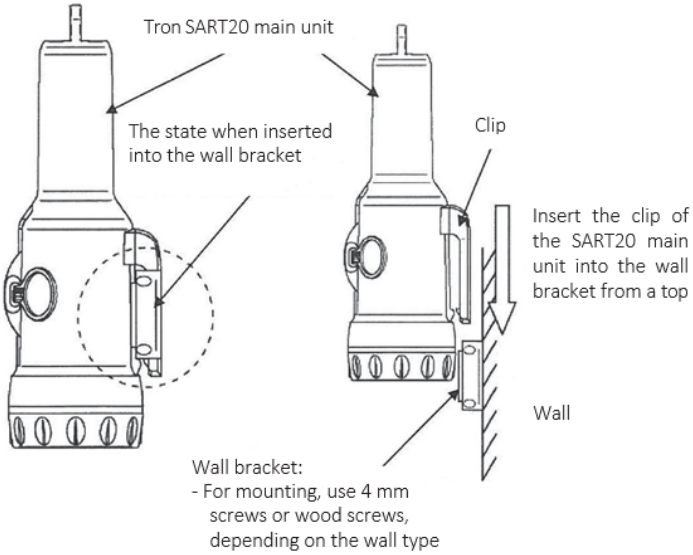


Figure 10 Illustration: Placement of Tron SART20 in a wall mount

5.1.2 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.

Important! The Tron SART20 must not be permanently stored in this bracket if mounted outside a freefall lifeboat. Move the Tron SART20 to this bracket after the lifeboat is deployed in water.

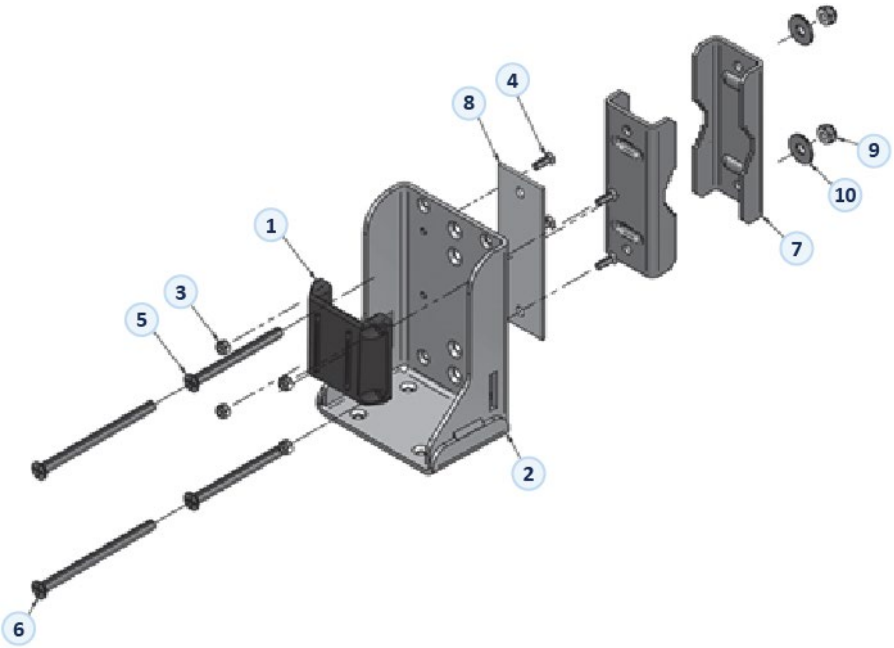


Figure 11 Illustration: Lifeboat bracket disassembled

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
8	M-84875	Washer plate
9	M-91469	Nu nylock M6 DIN 985
10	M-82275	Washer, DIN 9021 – Ø6mm

Table 1 List of components - lifeboat bracket

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

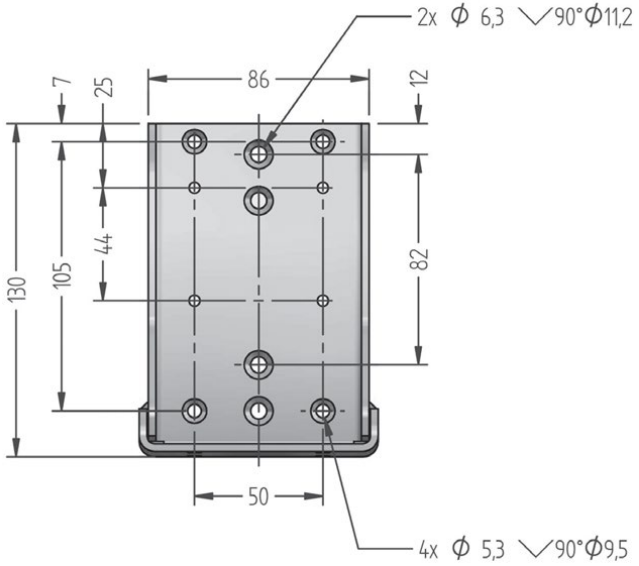


Figure 12 Illustration: Lifeboat bracket dimensions

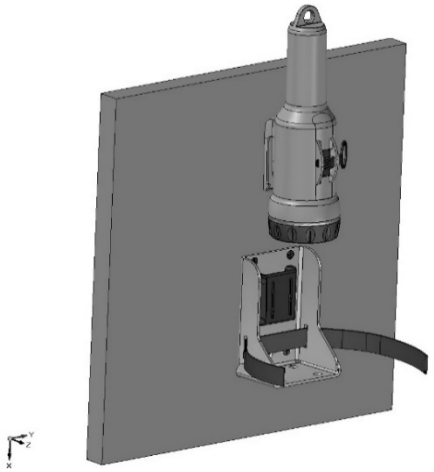


Figure 13 Illustration: Mounting - interior/exterior wall

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

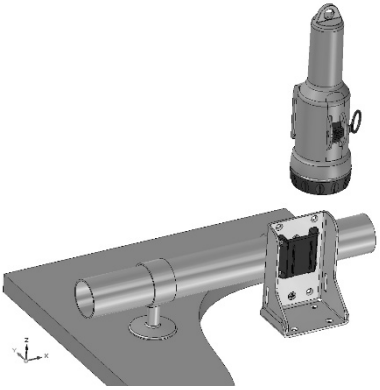


Figure 14 Illustration: Mounting on a pipe

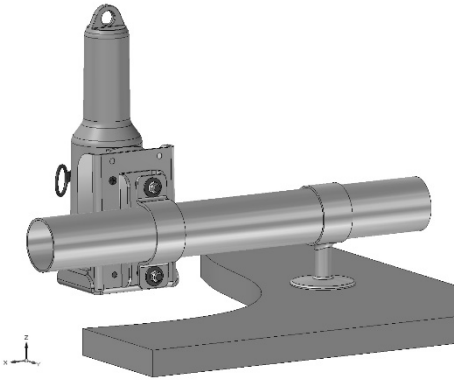


Figure 15 Illustration: Mounted ready on a pipe

Figure 16 Illustration: Placing the Tron SART20 into the lifeboat bracket

5.2 Non bracket mounting options

A Tron SART20 can be mounted on a lifeboat/life raft without a bracket in one of the following ways:

- Lanyard
- Telescopic pole

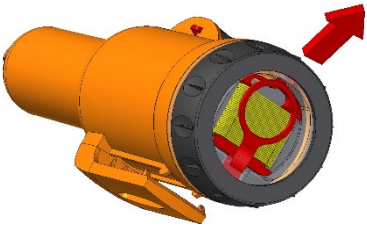
5.2.1 Mounting the lanyard

The lanyard is stored in the bottom lid and is 10 meters in length. Use the lanyard to tie the Tron SART20 to any object inside the life raft, where the unit can hang freely.

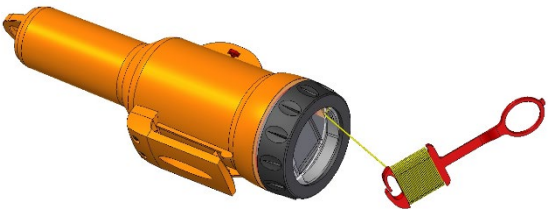
Caution! Keep the Tron SART20 away from any metal objects.

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 SART20.
4. Fasten the lanyard to the canopy.

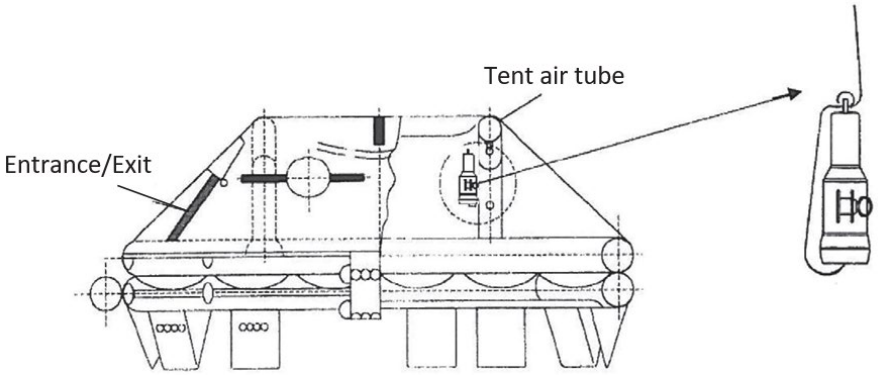


Figure 17 Illustration: Using the lanyard on a life raft

5.2.2 Mounting the telescopic pole

A telescopic pole can be used to extend the height of the Tron SART20 inside or outside the lifeboat/life raft.

Important! Ensure the rod is held as vertical as possible when activating the Tron SART20.

To use the telescopic pole, do the following:

1. Attach the Tron SART20 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 SART20 up through the tent air tube and secure it.

Figure 18 Illustration: Tron SART20 with telescopic pole attached

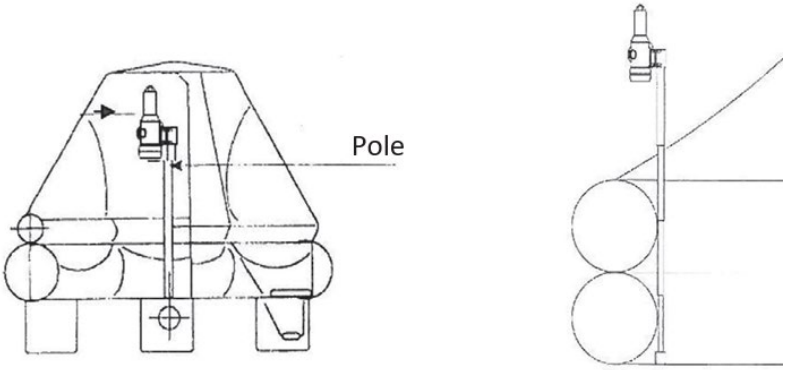


Figure 19 Illustration: Using the telescopic pole on a lifeboat

5.3 Replacing the battery module

How to replace the battery on the Tron SART20:

5.3.1 Disassembly

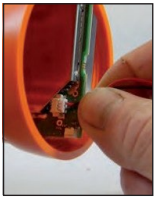
To disassemble the battery module, do the following:

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 5 grams silica gel bags.

5.3.2 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 5 grams silica gel bags.

4. Mount the rubber holder.

5. Remove the 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.



6 Operating instructions

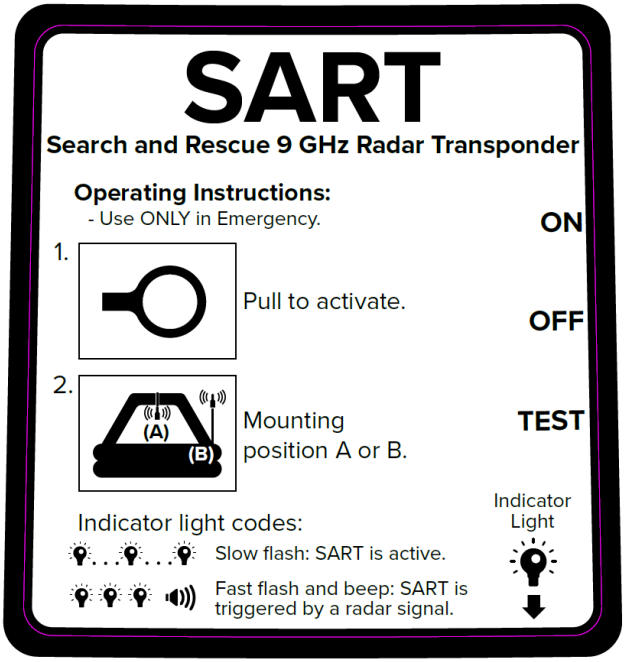


Figure 20 Image: Tron SART20 operating instructions label

The Tron SART20 should only be used in an emergency. The battery lasts for 96 hours from activation.

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

6.1 Activation

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

Note! The LED indicator starts to flash every 4 seconds, and the unit will also beep.

3. Secure the Tron SART20 to the lifeboat/life raft in a vertical position and as high as possible.

Note! When in range of an active 3 cm radar x-band, the internal loudspeaker will activate, and the flash rate will increase.

4. Use a handheld VHF radio to contact the approaching boat or helicopter.

6.2 Deactivation

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

7 Maintenance

The Tron SART20 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 outlined 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 2 Maintenance requirements

7.1 Testing

Although the Tron SART20 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 SART20:

Important! The test should be conducted in open sea to avoid interference on the radar display from land echoes.

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

Note! Simultaneously, a person should observe the radar display to check for correct pattern. The radar should be set to a 10 NM range.

2. Release the switch when the LED starts flashing.

Note! The Tron SART20 will now run through a self-test procedure.

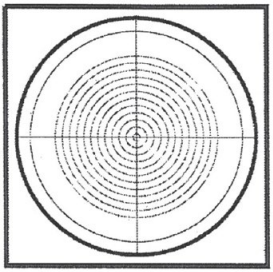
Caution! When a Tron SART20 is activated, it will respond to any 3 cm radars within range. Tests must be as short as possible (5 min) to avoid interference and battery capacity loss.

Note! Test procedure instructions are also indicated on the product label.

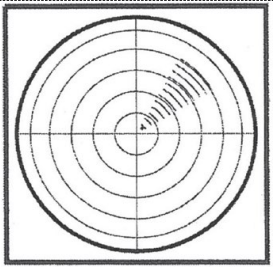
Testing of the Tron SART20 is done using the ship's own 3 cm X-band radar. Alternatively, a radar or a nearby ship can be used to test the unit. A ship-to-ship VHF channel should then be used to confirm operation.

The radar display will show different patterns depending on the range to the unit.

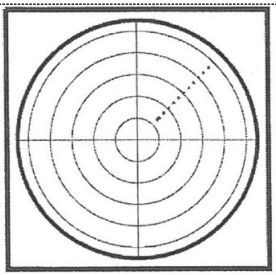
When the unit is located close to the radar, the signals will appear as rings on the radar display. The rings may be broken in some sectors, depending on the construction of the ship and other obstacles, and does not indicate an error in the unit. Placing it further away will reduce the signals to 12 dots on the radar display, showing the direction to the unit.



Typical display when Tron SART20 is located near (<0.2 NM) the radar. Radar range is 10 NM. Rings are off.



Typical display when Tron SART20 is located close (1 NM) to the radar. Radar range is 10 NM. Rings are at 2 NM.



Typical display when Tron SART20 is located away (>2 NM) from the radar. Radar range is 10 NM. Rings are at 2 NM.

Radars often have a special function to optimize reception of radar SART, either in TEST or ON. If the radar has this function, it will be detuned out of the best tuning condition, and erases or weakens all normal radar echoes, however, SART echoes are not erased because SART frequencies scans over all the X-band from 9.2 to 9.5 GHz. When this function is selected on the radar, the text "SART" is shown at the bottom of the display.

Note! Ensure the SART feature is turned off when SART detection is no longer necessary.

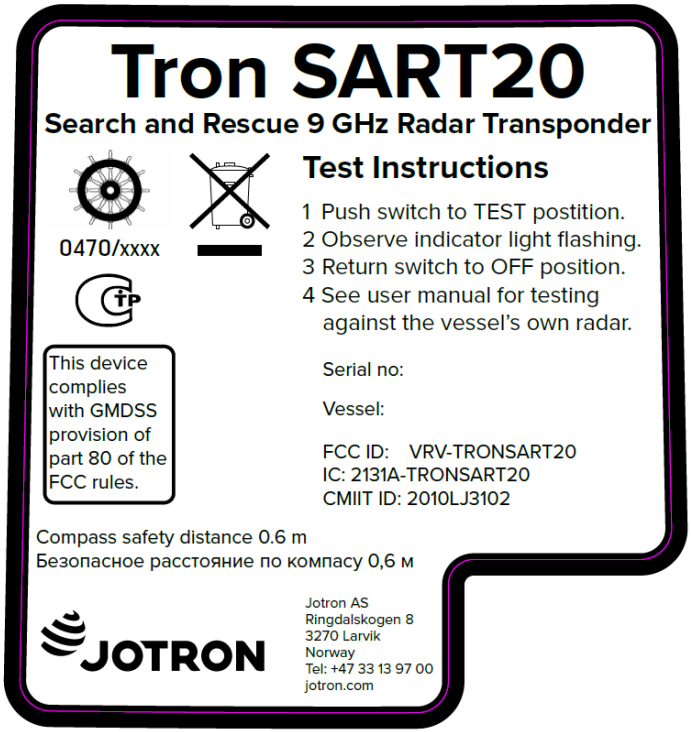


Figure 21 Image: Tron SART20 - Test instruction label

8 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

9 Battery safety information

Manufacturer name:	Primary lithium metal
Volts:	3.6 V/cell
Approximate weight:	51 grams/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-sart20/.

9.1 Handling and storage

This product should be stored in a cool and well-ventilated area. Elevated temperatures can result in a reduction in 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.

9.1.1 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-sart20/.

10 Technical specifications

10.1 Product specification

Battery type:	Primary lithium-thionyl chloride
Battery capacity:	7.2 V/3.6 Ah
Battery service life:	5 years
Materials:	
Housing:	Glass reinforced polycarbonate
Light cover:	Polycarbonate
Impact ring:	Thermo plastic elastomer
Unit dimensions (H/W/D):	250 mm x 89 mm x 89 mm
Weight:	480 grams
Temperature operating:	-20°C to +55°C (-4°F to +131°F)
Temperature storage:	-30°C to +65°C (-22°F to +149°F)
Operating life:	96 hours standby/+8 hours continuous operation at -20°C.
Lanyard length:	10 meters
Lanyard strength:	>25 kg

10.2 Radar transponder

Frequency:	X-band (3 cm) (9.2–9.5 GHz)
Radiated power (EIRP):	> 400 mW (+26 dB)
Sweep type:	12 sweep sawtooth type
	Forward 7.5 us ±1 us
	Return 0.4 us ±0.1 us

	Starts with return sweep
Receive sensitivity:	Better than -50 dBm e.r.s.
Response delay:	Max 0.5 us
Antenna pattern:	Horizontal polarization

10.3 Brackets

10.3.1 Wall bracket

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

10.3.2 Lifeboat bracket

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

11 Optional accessories

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

12 Spare parts

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

12.1 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.

13 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.

14 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.

15 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.

15.1 Service agents

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

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

16 List of figures

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