USERS MANUAL

Tron 45S/SX

JOTRON

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Amendment Records

AMEND-MENT NO.	INCORP. BY	DATE	PAGE(S)	VERSION	REASON FOR CHANGE
1	ES			A	New manual
2	ES			B	New company name
3	ES			C	
4	ES	19.01.07	36	D	New version
5	ES	19.03.08	17	E	New text
6	TH	06.02.09	Total: 36	F	New layout
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

EC Declaration of Conformity, available at www.jotron.com

Abbreviations and definitions

BAUD
Transmission rate unit of measurement for binary coded data (bit per second).

BIT
Short form of Binary Digit. The smallest element of data in a binary-coded value.

BITE
Built in test equipment

BPS
Bits Per Second.

CHARACTER STRING
Continuous characters (other than spaces) in a message.

CHECKSUM
The value sent with a binary-coded message to be checked at the receiving end to verify the integrity of the message.

COSPAS
COsmicheskaya Sistyema Poiska Avariynich Sudov (Space System for the Search of Vessels in Distress)

CLOCK
A precisely spaced, stable train of pulses generated within an electronic system to synchronize the timing of digital operations within the system.

DEFAULT
The operator initiates a condition that the navigator assumes automatically if no other condition.

EPIRB
Emergency Position Indicating Radio Beacon

GLOBAL POSITIONING SYSTEM (GPS)
The NAVSTAR Global Positioning System, which consists of orbiting satellites, a network of ground control stations, and user positioning and navigation equipment. The system has 24 satellites plus 3 active spare satellites in six orbital planes about 20,200 kilometers above the earth.

GPS
Global Position System

GPS SYSTEM TIME
Time corrected to Universal Time Coordinated (UTC) and used as the time standard by the user segment of the GPS system.

IEC
International Electro-technical Commission.

IMO
International Maritime Organization

INTERFACE
Electronic circuits that permit the passage of data between different types of devices; For example, the speed and heading interface circuit permits data from a speed log and compass to pass to the navigator processor.

ITU
International Telecommunication Union.

LED
Light Emitting Diode.

LUT
Local User Terminal (Ground Station).

MCC
Mission Control Centre.

PROCESSOR
The processor circuit card in the console that controls system operations and computes the positioning/navigation solutions.

RCC
Rescue Coordination Centre.

SARSAT
Search and Rescue Satellite-Aided Tracking System.

SBM
Shore Based Maintenance – as required by SOLAS regulation IV/15.9.2 of SOLAS 1974 as amended with, in accordance with MSC/Circ. 1039 guidelines for Shore-Based Maintenance (SBM) of Satellite EPIRBs within 5 years if:

Passenger ships (> 12 passengers) and cargo ships (> 300GT) engaged in International voyages, shall perform SBM as follows:
- Latest by the date of the EPIRB label with this text, or the battery Label, whichever is first.
- When this EPIRB becomes due for SBM in accordance with national requirements.

SOFTWARE
Values programmed and preloaded into memory. The values represent a permanent set of instructions for running the automatic functions (computations) of the navigator.

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

VSWR
Voltage standing wave ratio

IMPORTANT

TO PERMANENTLY DISABLE EPIRB

The battery module must be removed and treated according to chapter 6.1.2 paragraph 1, 2, 3 and 4, chapter 6.1.3, 6.1.4, 1.1.1 and 6.1.6 in this manual.

The information in this book has been carefully checked and is believed to be accurate. However, no responsibility is assumed for inaccuracies.

CAUTION!

This equipment contains CMOS integrated circuits. Observe handling precautions to avoid static discharges which may damage these devices. Jotron AS reserves the right to make changes without further notice to any products or modules described herein to improve reliability, function or design. Jotron AS does not assume any liability arising out of the application or use of the described product.

WARNING / IMPORTANT

Jotron AS is a prime manufacturer of safety equipment designed for rescue of human lives and their property. For safety equipment to be effective in line with the design parameters it is important that they are handled, stowed and maintained in compliance with the manufacturers instructions. Jotron AS can not be held responsible for any damage caused due to incorrect use of the equipment or breach of laid down procedures or for failure of any specific component or other parts of the equipment.

The chapter covering battery replacement (6.1.2) is added for information only. Jotron AS does not take any responsibility for improper disassembling/assembling of the beacon. We strongly recommend all service to be done by authorized Jotron AS agents. In addition to normal service, Jotron AS agents have the necessary equipment and education to test the operational functions of the beacon. Non-original maintenance and/or service parts may destroy the equipment function and performance.

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BATTERY SAFETY DATA SHEET

(Form: EEC directive 91/155)

(2) SAFETY ADVICE

S2 Keep out of reach of children.
S8 Keep container dry.
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S43 In case of fire, use D type extinguishers. Never use water.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

(3) FIRST AID MEASURES

In case of contact of cell contents with eyes, flush immediately with water for 15 min. With skin, wash with plenty of water and take off contaminated clothes. If inhaled, remove from exposure, give oxygen, seek medical advice.

(4) FIRE-FIGHTING MEASURES

Extinguishing media
Suitable:
Type D fire extinguishers

Not to be used:
Water - CO2 - Halon, dry chemical or foam extinguishers

Special exposure hazards
Generation of chlorine, sulphur dioxide, disulphur dichloride during thermal decomposition.

Special protective equipment
Use protective working boots, rubber apron and safety glasses with side shields.

INSTRUCTIONS FOR KEEPING THE RADIO LOG AND THE RADIO OPERATORS OBLIGATION ACCORDING TO NATIONAL AND INTERNATIONAL REGULATION.

1. The radio log shall be kept in accordance with requirements in the Radio Regulations, SOLAS Convention, national regulations regarding radio instal lations and the STCW Convention (STCW 95 including the STCW Code) including the relevant regulation regarding watch keeping on board passenger and cargo ships.
2. Unauthorized transmissions and incidents of harmful interference should, if possible, be identified, recorded in the radio log and brought to the attention of the Administration in compliance with the Radio Regulations, together with an appropriate extract from the radio log. (STCW Code B-VIII/2 No.32)

TEST OF RADIO EQUIPMENT AND RESERVE SOURCE OF ENERGY

Weekly:
GMDSS handheld VHF transceivers to be tested without using the mandatory required emergency batteries.

Monthly:
Float-free and manual EPIRBs to be checked using the means provided for testing on the equipment. Check data for periodical maintenance requirement for float-free EPIRB search and rescue radar transponders (SART) to be checked against 9 GHz radar.

False alerts transmitted by EPIRB
False alerts are a serious problem for the rescue service. Nearly 90% of EPIRB initiated distress alerts turn out to be false alarms.

If for any reason, your EPIRB should cause a false alarm, it is most important that you contact the nearest search and rescue authority and tell them it was a false alarm. They can then stand down any rescue service (coast radio station or appropriate CES or RCC). Use any means at your disposal to make contact. Switch off the distress alarm by de-activating your EPIRB, as soon as possible.

If your beacon is activated in a non-distress situation or a distress situation which has been resolved and you no longer require assistance, contact the nearest search and rescue authorities via the most expeditious means available with the following information:

Beacon ID number (15 character UIN):
Position (At time of activation):
Date of Activation:
Time of Activation (Time zone):
Duration of Activation:
Beacon marke and model:
Vessel Name/ID:
Circumstances/cause (if known):
The United States search and rescue authority is the U.S. Coast Guard. The primary points of contact are:

Pacific Ocean Area
USCG Pacific Area Command Centre
Tel: (510)-437-3701

Atlantic Ocean / Gulf of Mexico Area
USCG Atlantic Area Command Centre
Tel: (757)~398-6231

From Any Location
USCG Headquarters Command Centre
Tel: (800)-323-7233

Test and maintenance record

DATE	N/T/B	SIGN	INSP

N= New EPIRB installed, T= Test, B= New battery

1 GENERAL DESCRIPTION

The Tron 45SX and Tron 45S is emergency equipment consisting of:
• COSPAS/SARSAT emergency EPIRB for manually operation.
The purpose of the Tron 45S and Tron 45SX is to give a primary alarm to the search and rescue authorities. The EPIRB gives an immediate alarm when activated, transmitting the ID of the vessel in distress. Care must be taken not to activate the EPIRB unless in an emergency situation, in such cases the user will be held responsible. For periodic testing a test function is implemented. During the test cycle the EPIRB does a self-test on the transmitters and on the battery status. No emergency signal is transmitted during the self-test.

1.1 Tron 45SX

The Tron 45SX EPIRB is developed to meet the regulations and rules for use on vessels and life rafts in the maritime service according to the MED 96/98/EC directive, and meets the specifications for 406 MHz EPIRBs for use in search and rescue operations at sea. The Tron 45SX can be operated as a manual EPIRB, by manually releasing it from its bracket and/or container and then activating it by manual or seawater activation. The battery of the Tron 45SX EPIRB will last for at least 48 hours from activation of the EPIRB.

1.2 Tron 45S

The Tron 45S EPIRB is developed to meet the regulations and rules for use on small vessels and various other applications in the maritime service according to the R&TTE 1999/5/EC directive, and meets the specifications for 406 MHz EPIRBs for use in search and rescue operations at sea:
The Tron 45S can be operated as a manual EPIRB, by manually releasing it from its bracket and/or container and then activating it by manual or seawater activation.
The battery of the Tron 45S EPIRB will last for at least 24 hours from activation of the EPIRB.

1.3 Brackets

The Container brackets are typically used to store the EPIRB inside the wheel house or other protected areas of the ship. One bulkhead brackets is available for the Tron 45S. When the Tron 45S is mounted in the bracket, it must be manually removed before any operation can take place, therefore the bracket should be mounted in an easily accessible place where it can be reached in a hurry in case of emergency.

1.4 Standard supply 97800 Tron 45SX

Pos.:	Specification:	Quantity
	EPIRB Tron 45SX complete main unit	1
97802	Container, made from ABS	1
98955	Users manual	1

1.4.1 Options Tron 45SX

Pos.:	Specification:
99897	Programming
97801	Bracket, made from aluminium

1.4.2 Spare parts Tron 45SX

Pos.:	Specification:
97801	Bracket, made from aluminium
97802	Container, made from ABS
97812	Electronic unit , complete
97770	Battery, Tron 45SX, 5 years maintenance kit
97814	Antenna
97791	Label, battery
98955	Users manual for Tron 45S/SX

1.5 Standard supply 97796 Tron 45S

Pos.:	Specification:	Quantity
	EPIRB Tron 45S complete main unit	1
98955	Users manual	1

1.5.1 Options Tron 45S

Pos.:	Specification:
99897	Programming
97798	Container
97797	Bracket for use with container 97798
98876	Protective neoprene sock
82224	Bulkhead bracket, manual release
82226	MB-45 protective cover, wall mount version
82228	Plastimo 1``clamps for rail installation of MB-45 (vertical) - 2 each
82255	Quick release unit for MB-45
82370	Safety grab bag

1.5.2 Spare parts Tron 45S

Pos.:	Specification:
97812	Electronic unit, complete
97769	Battery, Tron 45S, 5 years maintenance kit
82224	Bulkhead bracket
97814	Antenna
97793	Label, battery
98955	Users manual for Tron 45S/SX

1.6 SYSTEM DESCRIPTION

The COSPAS/SARSAT system was introduced in 1982 as a worldwide search and rescue system with the help of satellites covering the earth's surface. Since the introduction of the system more than 18865 persons have been rescued by the COSPAS/ SARSAT system (2004). Currently the system consists of 5 functional satellites in a polar orbit constellation, these satellites cover the entire earth's surface and receive the emergency signal from the 406 MHz transmitter within the Tron 45S/SX, more polar orbiting satellites will be available in the future, giving a faster location and rescue time.

In addition several geostationary satellites are equipped with a 406 MHz transponder, these satellites are not able to locate the Tron 45S/SX but will give an

early warning to the rescue forces, minimising the time from an emergency occurs till the rescue forces are at the site. Each emergency EPIRB in the system is programmed with its own unique code, therefore it is vital that the ships data that is given to the dealer you obtained your Tron 45S/SX, is correct. It is also important that your EPIRB is registered in the database for each country. This database is normally located in the same country that the ship is registered.

1.6.1 SIGNAL DETECTION

See figure 7.1.a

When the Tron 45S/SX is activated it transmits on the frequencies 121.5 MHz and 406.025 MHz. An analogue signal is emitted on 121.5 MHz and a digital signal is transmitted on 406.025 MHz. After the Tron 45S/SX is activated, the next passing satellite will detect the transmitted signal and relay it to an antenna at a ground station, called an LUT.

For the 121.5 MHz signal the satellite must be within line of sight of both the Tron 45S/SX and a ground station. The ground station or LUT has a 2500 km satellite reception radius centred at the LUT. In areas without LUT coverage (mostly less populated areas in the southern hemisphere), signals from the 121.5 MHz transmitter will not be detected by the satellites, only by passing aircraft's. This is not the case with the 406 MHz transmitter, because the satellites have a memory unit, which stores the signals for relay to the next available LUT giving it a truly global coverage. Once the signal is received by the LUT, it is processed for location and sent to a Mission Control Centre (MCC). The MCC sorts the alert data according to geographic search and rescue regions and distributes the information to the appropriate Rescue Co-ordination Centre (RCC), or if outside the national search and rescue area, to the appropriate MCC that covers the area where the distress signal was detected. The RCC in turn takes the necessary action to initiate search and rescue activities.

The International Cospas-Sarsat System will cease satellite processing of 121.5/243 MHz beacons from 1 February 2009. From that date only 406 MHz beacons will be detected by the Cospas-Sarsat satellite system. This affects all maritime beacons (EPIRBs), all aviation beacons (ELTs) and all personal beacons (PLBs)

1.6.2 DISTRESS LOCATION DETERMINATION

See figure 7.1.b

The location of the distress signal is determined by taking measurements of the

doppler shift of the EPIRB frequency when the satellite first approach and then pass the EPIRB. The actual frequency is heard at the time of closest approach (TCA). Knowing the position of the satellite and using the received doppler signal information, it is possible to determine the location of the Tron 45S/SX from the satellite at the TCA. At the LUT, actually two positions are calculated. One is the actual position (A) and the other is the mirror image (B) position. A second satellite pass confirms the correct location (A). With the 406 system the real solution can be determined on the first pass with a reliability of nearly 90% and down to an accuracy of less than 5 km (3.1 miles).

1.6.3 EPIRB REGISTRATION

Normally the MCC will contact the vessel or the contact person registered in a shipping register and/or an EPIRB register (Ships owner, family member etc.) before alerting the RCC. This is to determine if the alarm from the EPIRB for some reason is a false alarm, and an expensive rescue operation can be avoided. Because of this it is important that the ships data is correct in the shipping register or in the EPIRB database. Tron 45S/SX purchased in some countries will have a registration form attached to it, it is important that this registration form is completed by the owner and returned to the place the EPIRB was purchased or to the address specified on the registration form.

Other countries use the already available shipping register to obtain the necessary information for a vessel in distress, in these countries the ship is already registered and no registration form is necessary, however it is vital that the coding of the Tron 45S/SX is kept up to date with data on the ship (nationality, call sign, etc.), to minimize the time from an alarm to the start of the search and rescue operation. Reprogramming the Tron 45S/SX can be done at authorized JOTRON agents in more than 180 different places throughout the world.

If you are a resident of the United States, you must register this beacon with the National Oceanic and Atmospheric Administration (NOAA) using the registration card included with the unit. Fill out the form and send it to:

SARSAT Beacon Registry, NOAA-SARSAT, E/SP3, FB4, Room 3320, 5200 Auth Road, Suitland, MD 20746-4304. Vessel owners shall advise NOAA in writing upon change of vessel or EPIRB ownership. Transfer of EPIRB to another vessel, or any other change in registration information, NOAA will provide registrants with proof of registration and change of registration postcards.

2 TECHNICAL SPECIFICATIONS

2.1 GENERAL

Dimensions:		
Tron 45S:	Height:	345 mm
	+ Antenna:	180 mm
	Max diameter:	85 mm
	Weight:	app. 0.7 kg
Tron 45SX:	Height:	490 mm
	+ Antenna:	180 mm
	Max diameter:	85 mm
	Weight:	app. 0.9 kg
Antenna:	Vertical polarisation, omnidirectional.	
Visual indication:	Built in Xenon flash and Test LED.	
Operating temperature:	-20°C to +55°C. Class2.	
Battery:	Tron 45S: X-97769 Lithium, 5 years service life. 2 pcs. SAFT LSH20 Lithium- Thionyl chloride (Li-SOCL2) Tron 45SX: X-97770 Lithium, 5 years service life. 4 pcs. SAFT LSH20 Lithium- Thionyl chloride (Li-SOCL2)	
Operating Life:	More than 24 hours at -20°C. (Tron 45S). More than 48 hours at -20°C. (Tron 45SX).	
Material housing:	Polycarbonate with 10% fibreglass.	
SW version:	1.31	

2.2 COSPAS/SARSAT TRANSMITTER

Frequency:	406.025 MHz - + 2 ppm
Output power:	5W -+ 2 dB
Protocols:	Maritime, Serialized, Radio Call sign
Modulation:	Phase modulation 1.1 -+ 0.1 rad
Data encoding:	Bi Phase L
Stability:	Short term <- 10-9 Medium term <- 10-9
Residual noise	<- 3x10-9 Bit rate: 400 b/s
Antenna:	Omni-directional.

2.3 HOMING TRANSMITTER

Frequency:	121.500 MHz
Output power:	Up to 100 mW.
Modulation:	A9, AM sweep tone between 300Hz and 1600Hz.
Sweep range:	700 Hz, Sweep rate: 2.5 Hz.
Stability:	10 ppm over temperature range.
Antenna:	Omni-directional.

2.4 BRACKETS

2.4.1 BRACKETS TRON 45S

2.4.2 BULKHEAD BRACKET (BMB) X-82224

Dimensions:	Height:	380 mm
	Width:	100 mm
	Depth:	100 mm
Weight:	200 g	
Material:	Light alloy	

2.4.3 MB45 BRACKET X-82226

Dimensions:	Height:	479 mm
	Width:	139 mm
	Depth:	120 mm
Weight:	720 g	
Material:	ABS with acryl cover	

2.5 BRACKET TRON 45SX X-97801

Dimensions:	Height:	520 mm
	Width:	100 mm
	Depth:	100 mm
Weight:	250 g	
Material:	Aluminium	

3 FUNCTIONAL DESCRIPTION

3.1 TRON 45S/SX

Tron 45S/SX may be split into the following main parts:

1. Electronic unit with antenna
2. Battery unit
3. Screw ring with gasket

3.2 ELECTRONIC UNIT WITH ANTENNA

The electronic unit consists of two printed circuit boards which are mounted in the upper housing. One is the VHF/Logic board and the other is the UHF board.

The Xenon flash and indicator LED is placed on the VHF/Logic board.
The main switch is also located on the main board.
The housing is made of polycarbonate.

3.3 BATTERY UNIT

In the lower part of the housing there is safety switch. This safety switch prevents activation whilst placed in the container or the bracket. A brass weight gives stability while floating.

The batteries are encapsulated by a thin copper foil, which acts as a ground plane for the antenna. The battery is moulded with silicon inside the battery container.

3.4 SCREW RING WITH GASKET

A screw ring holds the two parts of the housing together. An O-ring is fitted between the two parts.

4 INSTALLATION

4.1 BRACKETS

Manually Brackets:
Tron 45S - Bulkhead bracket.
Tron 45S – Bracket for Container.
Tron 45SX – Bracket for Container.
The manual brackets are used to store the beacon inside the wheelhouse or other protected places. The location must also be easily accessible for testing and maintenance. The bulkhead bracket are delivered with protective cover.

WARNING
DO NOT INSTALL THE EPIRB NEAR STRONG MAGNETIC FIELDS THAT COULD ACTIVATE THE BEACON

When the Tron 45S/SX is mounted in the brackets, it will operate as a manual unit. This bracket is typically used to store the EPIRB inside the wheelhouse or other protected areas of the ship. When the Tron 45S/SX is mounted in the brackets, it must be manually removed before any operation can take place, therefore the bracket should be mounted in an easily accessible place where it can be removed in a hurry in case of an emergency.

4.1.1 MOUNTING THE BRACKETS

See figures in chapter 1.1
The brackets are mounted with bolts according to the drawings. Use the bolts supplied with the bracket. The bracket could be mounted in either a vertical or horizontal position, whichever is the best regarding maintenance and operation.

5 OPERATION INSTRUCTIONS

5.1 OPERATION OF THE TRON 45S

When the Tron 45S is mounted in the Bulkhead mounting bracket (Bmb) it is a safety switch in the battery compartment that will prevent activation. This safety switch can be released by one action allowing the beacon to be manually activated in the bracket by a second action, activating the main switch.
As the first action, the beacon can also be released from the Bmb.

If the beacon is mounted in the Bmb inside the MB45, the first action of activation must be to remove the MB45 cover.
Mounted in the container, the Tron 45S has to be released from the container to be able to manually operate.

	Beacon mounted in Bmb	Beacon mounted in Bmb inside MB45	Beacon mounted in Container
First Action	Remove safety switch of Bmb or Remove Beacon from Bmb	Remove cover of MB45	Remove Beacon from Container
Second Action	Activate Main switch or Drop into water	Remove safety switch of Bmb orRemove Beacon from Bmb	Activate Main switch or Drop into water
Third Action		Activate Main switch or Drop into water	

Figure 5.1 actions of Tron 45S operation

5.2 MANUAL OPERATION OF THE TRON 45SX

See chapter 7.3
Remove the beacon from the bracket.
Remove lid on the container and pull the beacon out.

Drop the beacon into the water, or break the seal on the main switch and pull the locking pin. The switch will automatically go to the Emergency (ON) position.

The red indicator lamp and the Xenon flash on top of the beacon will start operating, indicating that the beacon is active.

NOTE!
The beacon performs a complete self-test before any emergency signals are transmitted. The Transmitters will start after approx. 70 seconds.
The transmission can be stopped by removing the beacon from the water, or turning the switch back to the READY position, and replace the locking pin.
Placing the Tron 45S/SX in the container or in its bracket will also turn the beacon off.

5.3 EPIRB MAIN SWITCH

Break the seal on the main switch and the switch will automatically go to the ON (Emergency) position.

The red indicator lamp and the Xenon flash on the main board will start operating, indicating that the EPIRB is active.

5.4 TESTING TRON 45S/SX

The beacon must be removed from the bracket or container before testing can be performed.
Turn the switch to the «TEST» position. The red indicator will start flashing for approx. 15 sec. This is to allow the internal OCXO (Oven Controlled Reference Oscillator) to warm up.
Then the output power of both transmitters are checked, the battery voltage and the PLL of the 406 Transmitter.
A complete message on the 406 Frequency is transmitted, with inverted frame sync.
If all tests are passed there will be one flash in the Xenon bulb, and the red indicator light will turn on and stay on until the switch is released.

A successful test will then consist of a series of rapid flashes in the test indicator, followed by one Xenon flash and continuous light in the test indicator.
Any other behaviour indicates a fault in the beacon.

6 MAINTENANCE AND TROUBLESHOOTING

6.1 EPIRB MODULE / BATTERY MODULE

The EPIRB shall be tested and approved as required by SOLAS regulation IV/15.9.2 of SOLAS 1974 as amended with, in accordance with MSC/Circ.1039 guidelines for shore-based maintenance of Satellite EPIRBs within 5 years if: Passenger ships (>12 passengers) and cargo ships (>300GT) engaged in international voyages, shall perform Shore-Based Maintenance (SMB) as follows:

- Latest by the date of the EPIRB label with this text, or the battery label, whichever is first.
- When this EPIRB becomes due for SBM in accordance with national requirements.

6.1.1 CHANGE OF BATTERY

If the Tron 45SX is the main EPIRB on board the vessel, the rules of SBM apply, and the battery must be changed at an SBM authorized workshop.
If the Tron 45SX is the second EPIRB on board the ship, authorized personnel can change the battery on board.

6.1.2 REPLACING THE BATTERY MODULE

The lower part of the beacon of the housing is replaced with a new one.
See chapter 7.3

1. Unscrew the ring.
2. Separate the two parts of the housing.
3. Disconnect the battery connector.
4. Check that the new battery is marked with date of expiration.
5. Place the new gasket on the battery housing.
6. Connect the battery connector.
7. Replace the upper part, taking care that the gasket is correctly fitted.
8. Replace the screw ring.
9. Perform a Self-test.

6.1.3 BATTERY DISPOSAL

Dispose in accordance with applicable regulations, which vary from country to country.(In most countries, the thrashing of used batteries is forbidden and the end-users are invited to dispose of them properly, eventually through non-profit organizations, mandated by local governments or organized on a voluntary basis by professionals).Lithium batteries should have their terminals insulated prior to disposal.

6.1.4 INCINERATION

Incineration should never be performed by battery users but eventually by trained professionals in authorized facilities with proper gas and fumes treatment.

6.1.5 LAND FILLING

Leachability regulations (mg/l)

Component	Leachability	EC limit	EPA	Other*
Iron	100			5
Nickel	100	500	2	0,5

* Applicable to France

6.1.6 RECYCLING

Send to authorized recycling facilities, eventually through a licensed waste carrier.

6.2 TRON 45S/SX SELF TEST

1. Remove the EPIRB from the bracket.
2. Press the spring-loaded switch on top of the EPIRB to "TEST" position.
   Keep hands and objects away from the antenna.
3. A successful test will consist of a series of flashes on the red LED test indicator, followed by a continuous light and a Xenon strobe flash after app. 15 seconds. This is to allow the internal
   OCXO (Oven Controlled Reference Oscillator) to warm up.
   Then the output power of both transmitters are checked, the battery voltage and the PLL of the 406 Transmitter.
   A complete message on the 406 Frequency is transmitted, with inver ted frame sync.
4. If the EPIRB fails to end up with a continuous light, this indicates a fault in the EPIRB.
   See chapter 1.1.

6.3 MAINTENANCE OF JOTRON EPIRB

Every Month: Perform EPIRB self-test. See chapter 6.2.
What the self-test actually does is to send out a short test signal on 121,5 and 406,037MHz, testing the output of the transmitter. While transmitting the test signal, the battery voltage, output power and phase lock is tested. During the

test of the 406MHz transmitter a test message is transmitted, this test message is coded with a special synchronization code and will not be recognized as real alert by the COSPAS/SARSAT satellites. Carry out visual inspection for defects on both the Tron 45S/SX and Bracket. The Tron 45S/SX should be easily removed and replaced in the Bracket. Make sure that the Tron 45S/SX and Bracket is not painted or otherwise covered with chemicals, oil, etc. Check the expiry date of the EPIRB Battery and the Hydrostatic Release Mechanism. Check the presence of a firmly attached lanyard in good condition and that it is neatly stowed and is not tied to the vessel or the mounting bracket. If the Tron 45S/SX is the main EPIRB on board, these rules must be followed:

Every 12th month:
If the Tron 45S/SX is the main EPIRB on board and the ship falls under the SOLAS regulations of SBM, these rules must be followed: Perform extended annual test according to IMO's MSC/Circ.1040 (Annual testing of 406 MHz satellite EPIRBs) as required by SOLAS IV/15.9.This test can be carried out by one of Jotron's authorized representatives or any other service provider in possession of a Tron UNIDEC, Tron DEC or any other Cospas/Sarsat EPIRB tester/decoder.

Every 2ndYear:
Hydrostatic Release Mechanism including Plastic Bolt on the Float Free Brackets must be replaced. (Check expiry date on label).

Every 5thYear:
See chapter 6.1.

6.4 EPIRB ERROR MESSAGES

If the self-test detects a fault in the EPIRB module one or more of the following indications are shown:

1. Flashing LED for 15 sec. followed by one (1) flash, no Xenon flash:
   Error: Low power on 406 MHz transmitter
2. Flashing LED for 15 sec. followed by two (2) flashes, no Xenon flash:
   Error: Low battery voltage
3. Flashing LED for 15 sec. followed by three (3) flashes, no Xenon flash:
   Error: Low power on 121.5 MHz transmitter
4. Flashing LED for 15 sec. followed by four- (4) flash, no Xenon flash:
   Error: PLL on 406 Transmitter out of lock
5. Five (5) flashes, no Xenon flash:
   Error: EPIRB module not programmed or programming not complete

7 FIGURES

7.1 SIGNAL DETECTION

See chapter 1.6.1 and 1.6.2.

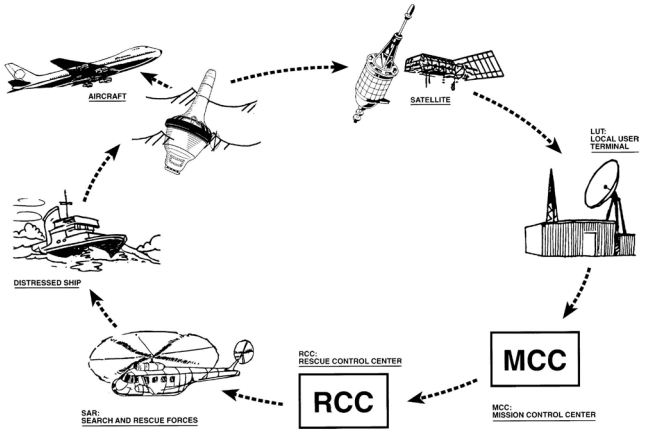


Figure 7.1.a

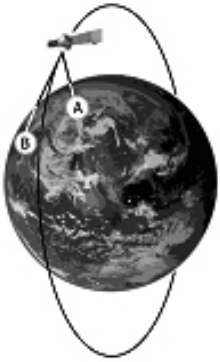
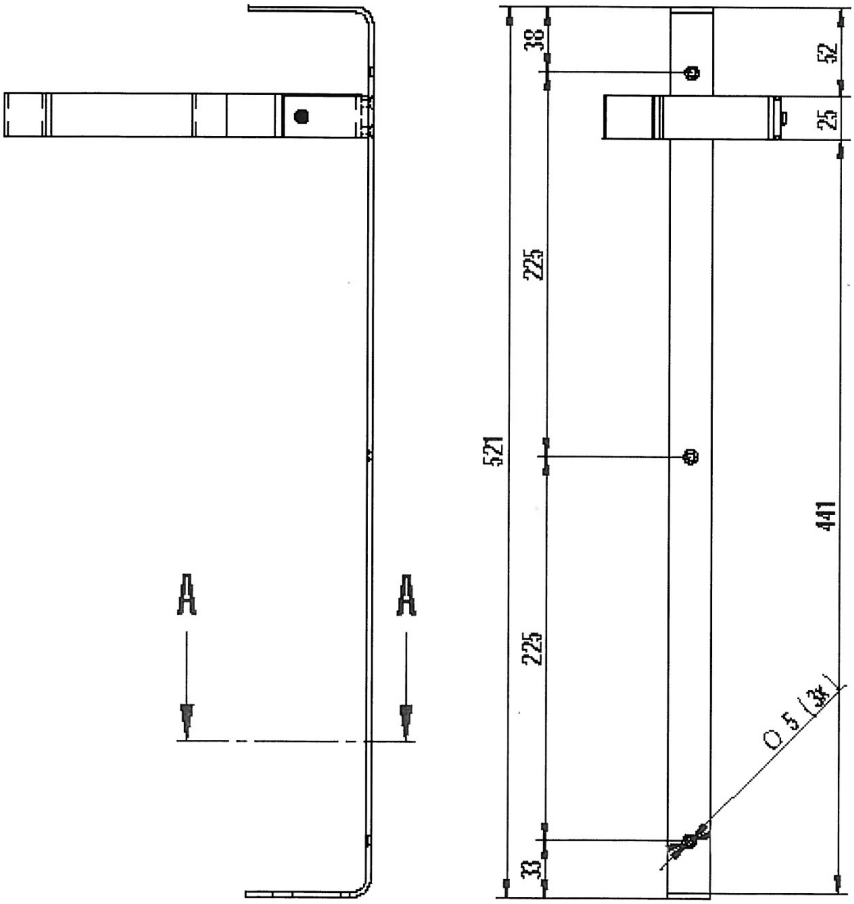


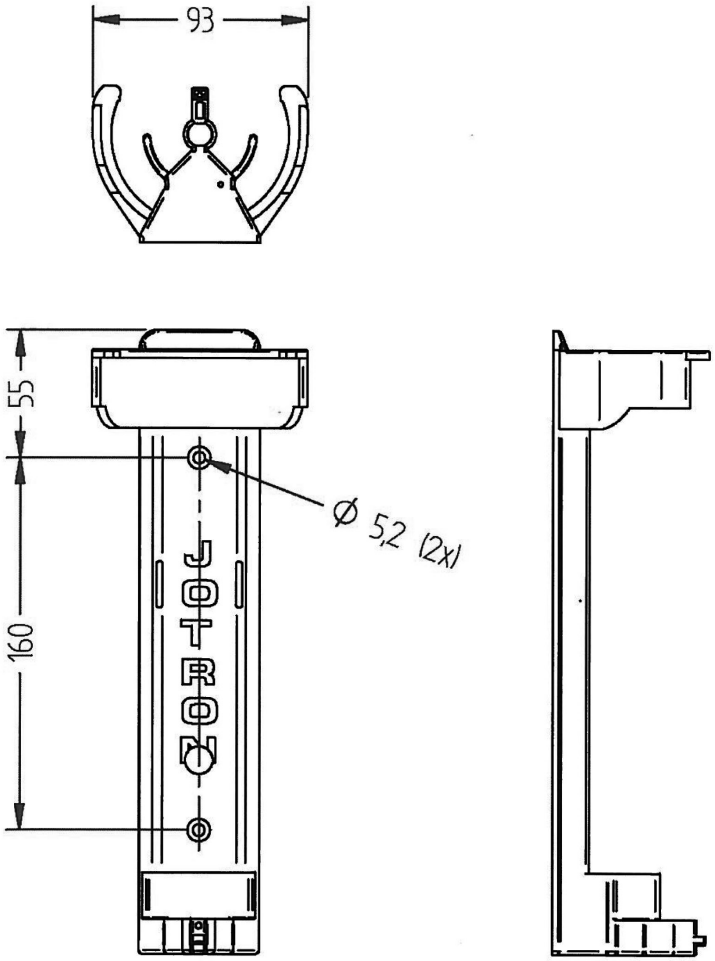
Figure 7.1.b

7.2 BRACKET DRAWINGS

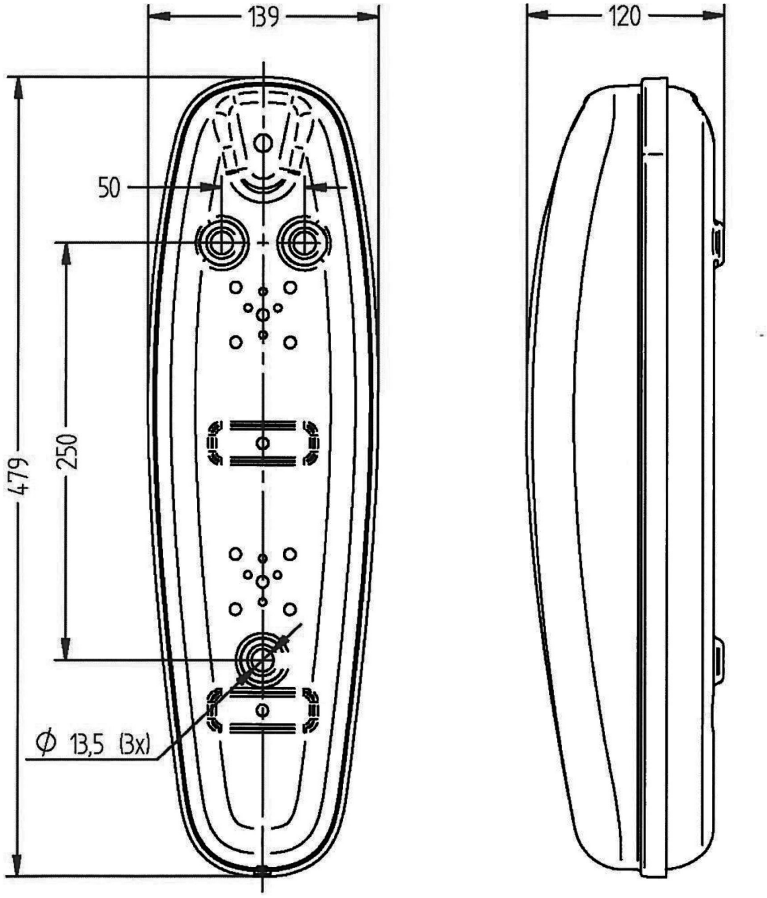
7.2.1 BRACKET, ALUMINIUM



7.2.2 BULKHEAD BRACKET

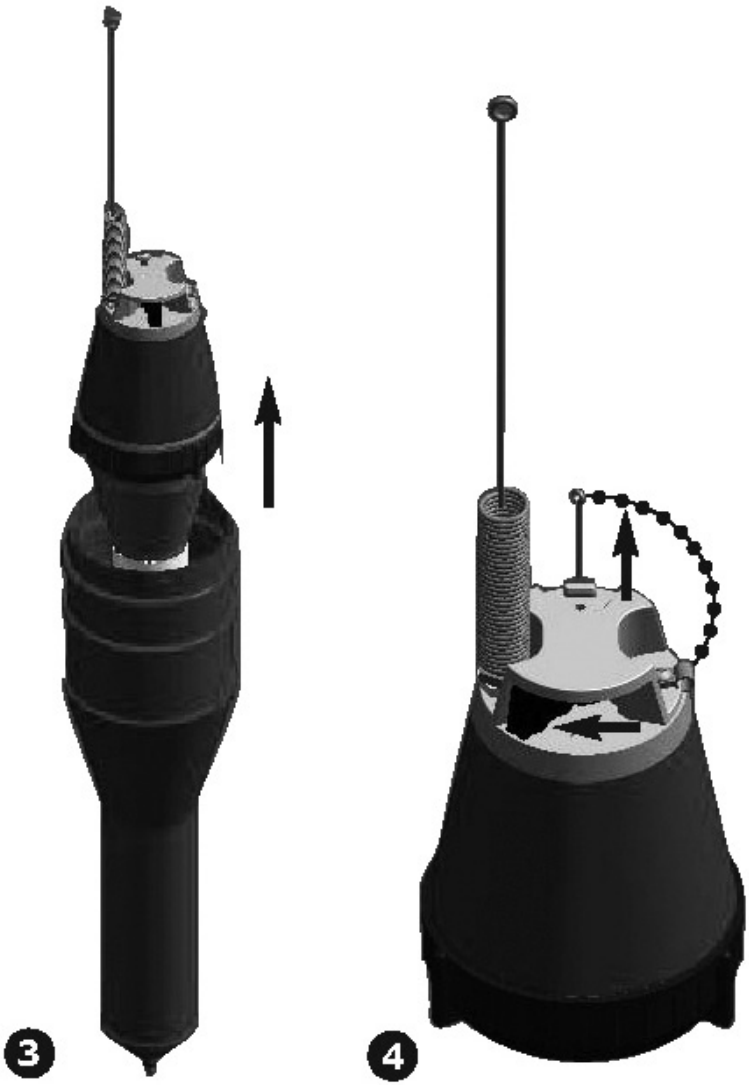


7.2.3 MB45 BRACKET



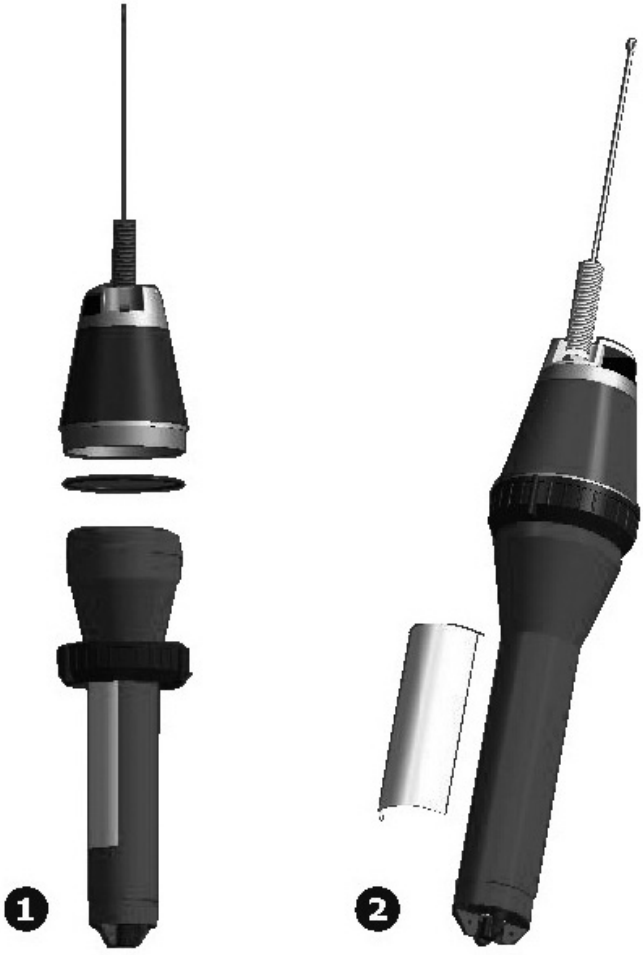
7.3 MANUAL OPERATION OF THE TRON 45SX

See chapter 5.2


3
4

7.3 REPLACING BATTERY MODULE

See chapter 6.1.2



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