BATTERY SAFETY DATA SHEET

(Form: EEC directive 91/155)

(2) SAFETY ADVICE

S...:	S2	Keep out of reach from 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 immedately (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 inhalation, remove from exposure, give oxygen, seek medical advice.

(4) FIRE-FIGHTING MEASURES

Extinguishing media

Suitable:	Type D fire extinguishers
Not to be used:	Water - CO_2 - Halon, dry chemical or foam extingiushers

Special exposure hazards

Generation of chlorine, sulfur dioxide, disulfur dichloride during thermal decomposition.

Special protective equipment

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

REVISION HISTORY

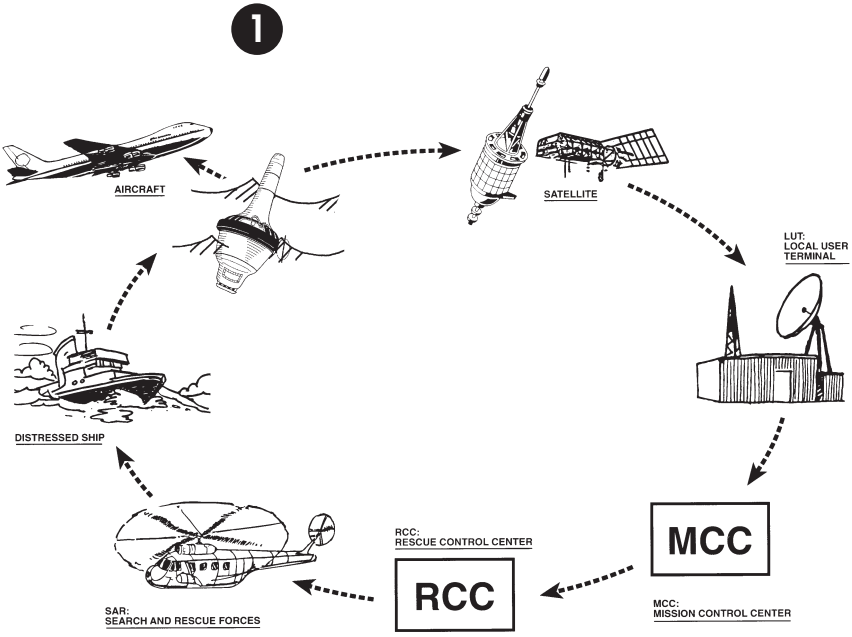
REVISION	CHAPTER	VERSION
Selftest will not function in bracket anymore	3,3	D

TEST AND MAINTENANCE RECORD

DATE	N/T/B	SIGN	INSP

N=NEW EPIRB INSTALLED, T=TEST, B=NEW BATTERY

FIG.1


1
AIRCRAFT
SATELLITE
LUT:
LOCAL USER
TERMINAL
DISTRESSED SHIP
MCC
MCC:
MISSION CONTROL CENTER
RCC:
RESCUE CONTROL CENTER
RCC
SAR:
SEARCH AND RESCUE FORCES

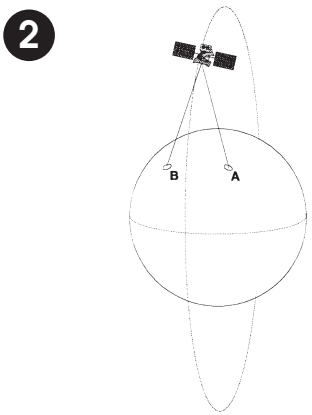

2
B
A

FIG. 2
MANUAL OPERATION [3.1]

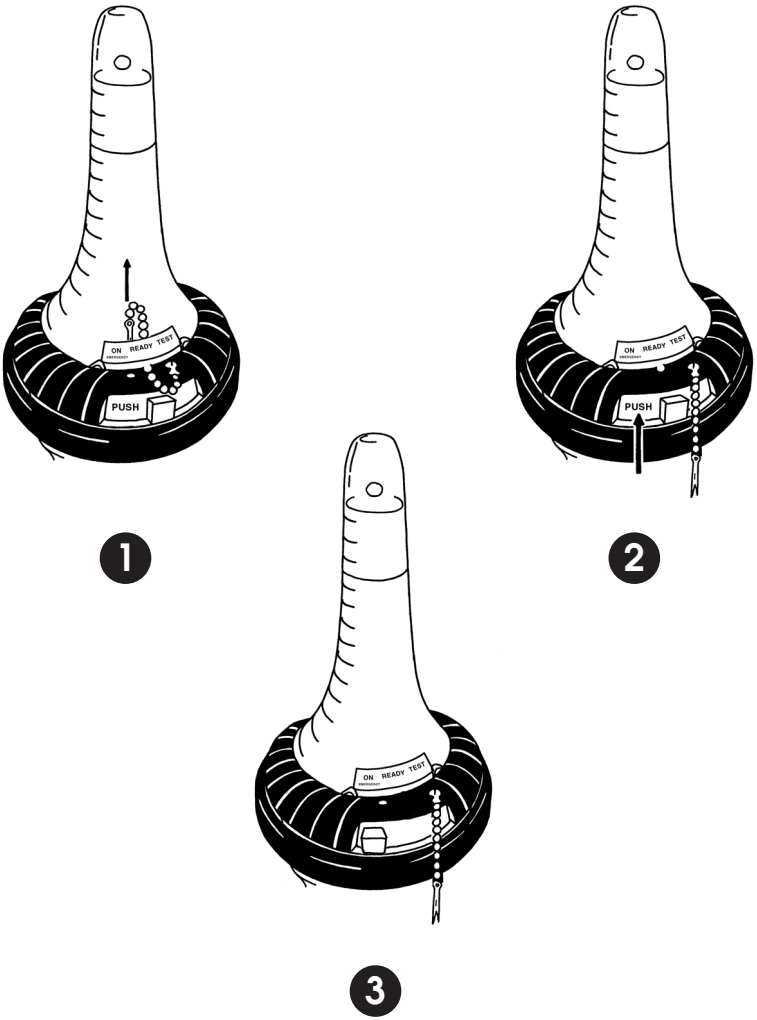


FIG. 3
AUTOMATIC OPERATION [3.2]

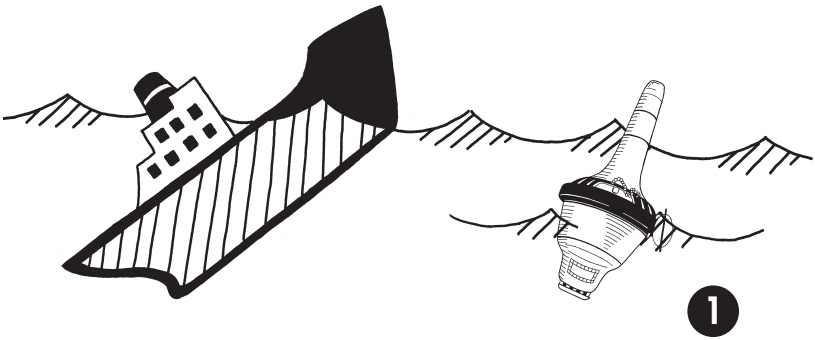


FIG. 4
SELFTEST [3.3]

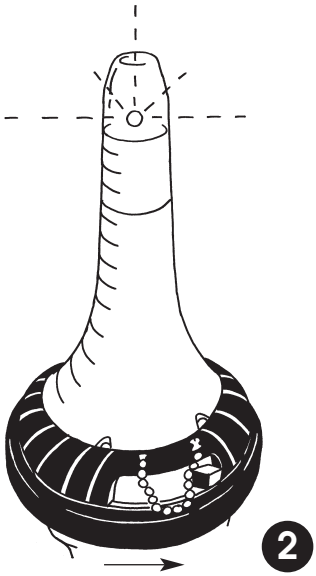


FIG. 5 [4.1]
MOUNTING OF HYDROSTATIC RELEASE MECHANISM

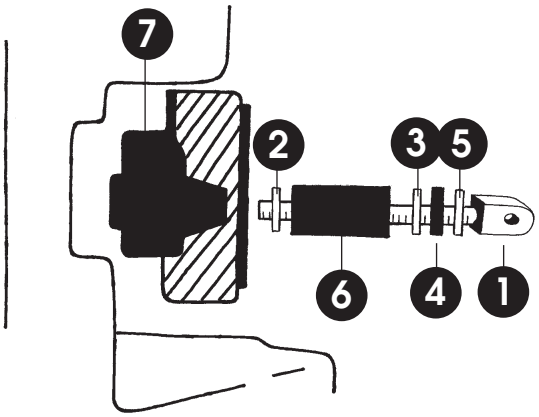
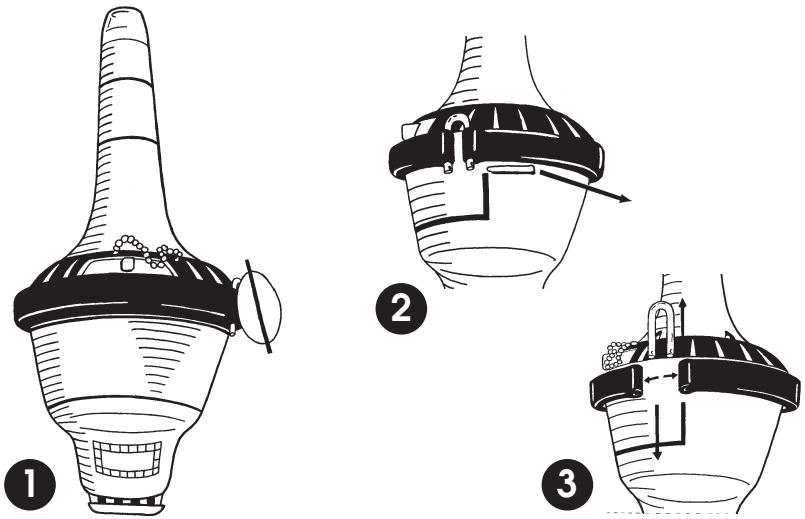
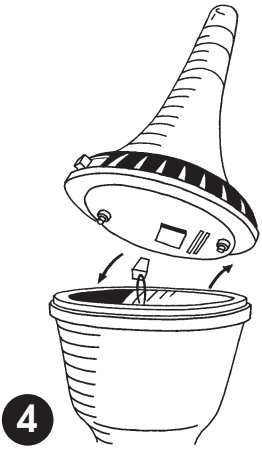


FIG. 6
REPLACING THE BATTERY UNIT [4.2]





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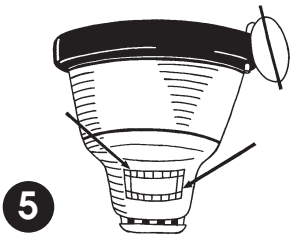

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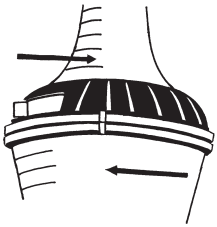

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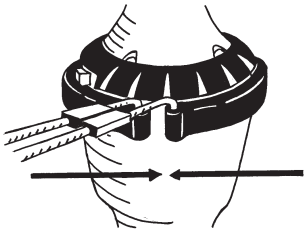

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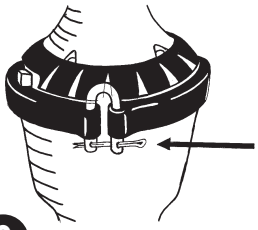

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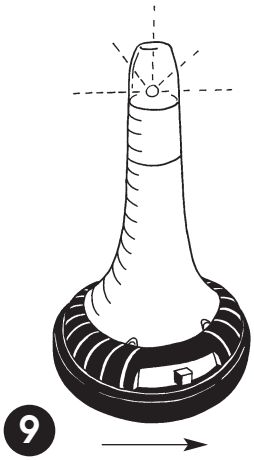
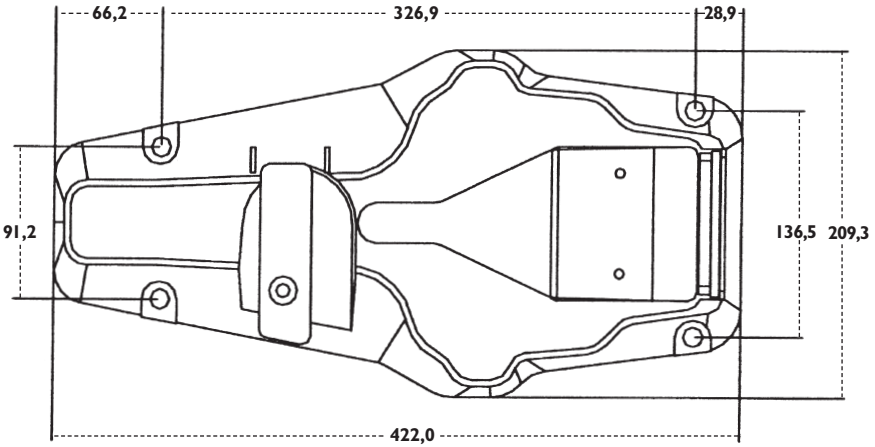


9

10

FIG. 7
MOUNTING OF BRACKETS (FB4, FBH4, MB4)



TECHNICAL SPECIFICATIONS

GENERAL

Item:	Description:
Battery:	Lithium, 4 years service life.
Housing:	Polycarbonate w/ 10% glassfibre
Dimensions:	Height: 379 mm Max diameter: 180 mm Weight: app. 2.0 kg
Materials:	Polycarbonate.
Compass safe distance:	1.5 m
Temperature range:	-20°C to + 55°C
Operating life:	Minimum 48 hours at -20°C

SARSAT/COSPAS TRANSMITTER

Item:	Description:
Frequency:	406.025 MHz ± 2 ppm
Output power:	5W ± 2 dB
Protocols:	Maritime, Serialised, Radio Callsign
Modulation:	Phase modulation 1.1 ± 0.1 rad
Data encoding:	Bi Phase L
Stability:	
Short term	$\leq 10^{-9}$
Medium term	$\leq 10^{-9}$
Residual noise	$\leq 3x10^{-9}$
Bitrate:	400 b/s
Antenna:	Built in, omnidirectonal.

HOMING TRANSMITTER

Frequency:	121.500 MHz
Output power:	Up to 100 mW, depending on model.
Modulation:	A9, AM sweep tone. Range 700 Hz. Sweep rate 2.5 Hz.
Stability:	10 ppm over temperature range.
Antenna:	Built in, omnidirectional.

BRACKETS

Materials:	Luran S
Dimensions:	length: 422 mm Width: 209 mm Depth w/Beacon intalled: 200 mm Weight: app 1.6 kg
Release mechanism:	Hydrostatic release unit Hammar H20

GLOSSARY

COSPAS

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

SARSAT

Search and Rescue Satellite-Aided Tracking System

EPIRB	Emergency Position Indicating Radio Beacon
LUT	Local User Terminal (Ground Station)
MCC	Mission Control Center
RCC	Rescue Coordination Center
km	kilometer
MHz	Mega-Hertz (10^6 Hertz)

1 INTRODUCTION

1.1 GENERAL

The Tron 40S is an emergency equipment consisting of:

- Tron 40S COSPAS/SARSAT EPIRB
- One of the following brackets:
  FB4 – Automatic float free bracket.
  MB4 – Manual bracket.
  FBH4 – Automatic float free bracket v/ Heating.

The JOTRON Tron 40S EPIRB is developed to meet the regulations and rules for use on vessels and life rafts in the maritime service. Tron 40S meets the following specifications for 406 MHz EPIRBs for use in search and rescue operations at sea:

- ETS 300 066
- MPT 1259
- C/S T.001
- IMO A695 (17){1}
- IMO A810 (19)

The Tron 40S is buoyant, and is designed to automatically release and activate in case of an emergency where the EPIRB and its bracket is submerged into the sea. The Tron 40S can also be operated as a manual EPIRB.
Three mounting brackets are available to mount it either as an automatic or manual only EPIRB. The purpose of the Tron 40S 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 ship 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 selftest on the transmitters and on the battery status. No emergency signal is transmitted during the selftest. The battery of the EPIRB will last for at least 48 hours from activation of the EPIRB.

1.2 SYSTEM DESCRIPTION

The COSPAS/SARSAT system was introduced in 1982 as a world-wide search and rescue system with the help of satellites covering the earth's surface. Since the introduction of the system more than 5500 persons have been rescued by the COSPAS/SARSAT system (June 1995).

Currently the system consists of 6 different 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 40S, 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 40S 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 40S, 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.

1.3 SIGNAL DETECTION [FIG.1]

When the Tron 40S is activated (manually or automatically) 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 40S is activated, the next passing satellite will detect the transmitted signal and relay it to an antenna at a ground station, called a LUT.

For the 121.5 MHz signal the satellite must be within line of sight of both the Tron 40S 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 that the distress signal was detected. The RCC in turn takes the necessary action to initiate search and rescue activities.

1.4 DISTRESS LOCATION DETERMINATION

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 40S 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 [FIG. 1.2]. 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).

1.5 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 40S 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 40S is kept up to date with datas on the ship (nationality, call.sign, etc.), to minimise the time from an alarm to the start of the search and rescue operation. Reprogramming the Tron 40S can be done at authorised JOTRON agents in more than 40 different places throughout the world.

2 EPIRB Tron 40S

2.1 FEATURES

- *Watertight:*
  Tron 40S is watertight to a depth of minimum 10 meter.
- *Buoyant:*
  Tron 40S is buoyant.
- *Rugged design:*
  The Tron 40S will withstand a drop from 40 meters into the water. It is resistant to seawater, oil and sunlight.
- *Handling:*
  The Tron 40S is made for easy operation, with a brief operating instruction printed on the unit. It comes standard with a 20 meter rope that can be attached to the liferaft.
- *Indicators:*
  The Tron 40S are equipped with a LED and a built in strobe

light to show operation of the EPIRB. The strobe light and LED will normally flash with a frequency of 20 per minute to show that the EPIRB is activated.

- *Battery unit.*
  The battery unit consists of the complete lower half of the Tron 40S and is to be replaced every 4. year. The marking on the battery unit show the expiry date.
  A new battery comes complete and are easily replaced by opening the equator ring between the top and bottom of the EPIRB.
- *Hydrostatic unit.*
  The hydrostatic unit fitted on the float free bracket (FB4) must be replaced every 2. year. Marking on the hydrostatic unit show the expiry date. The hydrostatic comes complete with a new bolt and accessories.

2.2 STORAGE

The EPIRB is normally stored in its bracket. The bracket contains means to prevent accidental activation of the EPIRB. The bracket should be mounted in a place that is easily available for periodic testing, and a place which is easily accessible in case an emergency situation occur.

3 OPERATING INSTRUCTIONS

The Tron 40S is designed to be operated either manually or automatically. The EPIRB is always armed, that is the EPIRB will automatically start to transmit when the EPIRB is out of the bracket and deployed into water. In the lower part of the EPIRB there is an automatic safety switch. This switch prevents the seawatercontacts from operating the EPIRB automatically (caused by ice, sea-spray etc.) as long as the EPIRB is placed in its bracket.

3.1 MANUAL OPERATION [FIG.2]

- Break the seal and pull the locking pin holding the main switch.
- Push slider to move switch to EMERGENCY position.
- The switch is spring loaded and will automatically go to the EMERGENCY position.
- The LED indicator, located at the top of the EPIRB, will start flashing indicating that the EPIRB is operating. In addition the strobe light will start to operate.
- If possible keep the EPIRB in an open area, away from any metal objects (ship construction etc.) that may limit the satellite coverage.
- Transmission can be stopped by turning the switch to READY position.

3.2 AUTOM. OPERATION (FB4 AND FBH4) [FIG.3]

The Tron 40S will automatically release from the bracket, float to the surface and start to transmit, when the EPIRB in its bracket is deployed into water at a depth of app. 2-4 meters (6 – 13 feet).
Alternatively the EPIRB can be manually released from the bracket and put into the water. Transmission will continue until the EPIRB is lifted out of the water, and dried off. The transmission can also be stopped by placing the EPIRB in the bracket.

3.3 TESTING THE TRON 40S [FIG.4]

To perform the self test, the EPIRB has to be removed from the bracket.

- Press the spring-loaded main switch of the EPIRB to the TEST position. Keep hands and other objects away from the upper part of the EPIRB (away from the antenna).
- A successful test will consist of a series of blinks on the LED test-indicator, followed by a continuous light and a strobe flash after app. 15 seconds.

- If the EPIRB fail to end up with a continuos light, this indicates a fault in the EPIRB.
- Release the switch and put the EPIRB back into the bracket.

What the self test actually does is first to wait app. 15 seconds to allow the reference oscillator inside the EPIRB to warm up. Then a short burst is transmitted by the 121.5 MHz transmitter, while the output level of the transmitter is checked. Finally, a test signal is transmitted by the 406 transmitter. During this test signal the battery voltage, output power and frequency is checked.

While testing the 406 MHz transmitter a test message is transmitted, this test message is coded with a special synchronisation code and will not be detected by the COSPAS/SARSAT satellites. The purpose of this test message is to control the actual coding of the EPIRB. This can be done with the JOTRON test unit TronDEC or an other EPIRB checker.

4 MAINTENANCE

Every 3. month:
Perform internal selftest (see chapter 3.3)
Check the bracket for any damages, the EPIRB should be easily removed and replaced in the bracket. Make sure that the bracket is not painted or otherwise covered with chemicals, oil, etc. Check the expiry date of the hydrostatic release mechanism and the battery unit.

Every 2. year:
Perform extended test with the help of a TronDEC decoder. This test can be performed by one of the authorised JOTRON agents with TronSTAT facilities. The test ensures that the EPIRB is within its specifications and complies with the COSPAS / SARSAT system. Hydrostatic

release mechanism on the float free brackets must be changed (see chapter 4.1).

Every 4. year:
In addition to the 2. year maintenance, the battery unit must be replaced (see chapter 4.2).

4.1 REPLACING THE RELEASE MECHANISM [FIG.5]

- Remove the EPIRB from its bracket (chapter).
- Unscrew the plastic bolt and remove the hydrostatic release mechanism.
- Check expiration date on the new hydrostatic release mechanism. The date should be approximately 2 years from the date of purchase.
- Mount the new hydrostatic release mechanism. The units is fixed to the bracket with a washer, rubber seal, washer, spacer O-ring and a plastic bolt.
- Secure the plastic bolt by hand force only!

4.2 REPLACING THE BATTERY UNIT [FIG.6]

Replacing the battery unit should be done by skilled technicians only – preferable by a JOTRON agent. Your closest JOTRON agent with TronSTAT facilities has been specially trained to perform the necessary operation and is also able to do an extended test of the EPIRB, ensuring that the EPIRB operates within the specifications.

- Remove the EPIRB from its bracket (chapter 3.1).
- Remove the equator ring by pressing it out from the housing.
- Separate the two halves of the EPIRB housing.
- Unplug the 6 pin connector that comes from the lower EPIRB housing.
- Control that the new battery unit is marked with X-97780 and has a new expiration date approximately 4 years from purchase.
- Fit a new gasket on top of the battery unit and reconnect the 6

pin connector, be sure that the connector is fitted properly. A noticeable «click» should be heard when the connector is in place.

- Orientate the two halves of the EPIRB the following way: An orientation tab is fitted on both halves of the EPIRB, These tabs must be placed carefully on top of each other.
- Make sure that the gasket is properly in place, and replace the equator ring using a special tool to tighten it together.
- Replace the U-shaped bolt and a new split pin to secure the bolt in the equator ring.
- Follow the procedure in chapter 3.3 and test the EPIRB.
- Replace EPIRB in its bracket.

5 BRACKETS

3 different brackets are currently available for the Tron 40S. MB4 is the manual bracket and FB4 and FBH4 is the automatic bracket. The manual bracket comes without the hydrostatic release mechanism and is used to store the beacon inside the wheelhouse or other protected places. The automatic bracket is mounted in a free space outside where the beacon can be released automatically.

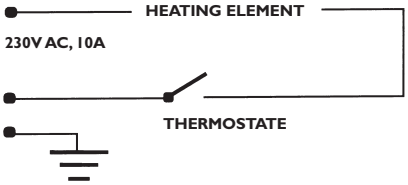
5.1 FLOAT FREE BRACKET FB4 AND FBH4

When the Tron 40S is mounted in the float-free bracket, FB4 and FBH4, it will operate as an automatic float free unit. Since the release of the EPIRB will be automatic it is important to mount the bracket in a place where there are no obstacles that can endanger the automatic release of the EPIRB. The location where the bracket is mounted should be as high as possible on the vessel, and well protected from environmental conditions such as direct sea-spray, chemicals, oil, exhaust and vibrations. The location must also be easily accessible for testing and maintenance.

5.2 FLOAT FREE BRACKET FBH4

The float free bracket FBH4 must be connected to the fixed installation (230V AC, 10A) through the thermostate connection box according to the connection diagram below.

CONNETION DIAGRAM



5.3 MANUAL BRACKET MB4

When the Tron 40S is mounted in the MB4 bracket, it will operate as a manual unit. This bracket is similar to the FB4 bracket but does not have the hydrostatic release mechanism. This bracket is typically used to store the EPIRB inside the wheel house or other protected areas of the ship. The bracket should be mounted in an easily accessible place where it can be reached in a hurry in case of an emergency.

5.4 MOUNTING THE FB4/FBH4/MB4 BRACKETS [FIG.7]

The bracket is mounted with 4x8mm bolts according to the drawing in Fig.7.
The bracket could be mounted in either an upright or horizontal position, whichever is the best regarding maintenance and operation.

Notes

Notes

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