



DMA176N

Emergency Locator Transmitter

Orolia S.A.S.

INSTALLATION MANUAL OPERATION MANUAL



KANNAD 406 AS

P/N: S1823502-02

P/N: S1823502-03

P/N: S1820514-14

P/N: S1820511-02

P/N: S1820511-05

P/N: S1820511-03

P/N: S1820511-03

ELT, KANNAD 406 AS (BNC)

ELT, KANNAD 406 AS (TNC)

WATER SWITCH SENSOR

MOUNTING BRACKET, AS

MOUNTING BRACKET, AS-PLUS

CARRY-OFF BAG, AS

CARRY-OFF BAG, Short

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INTRODUCTION

The instructions in this manual provide the information necessary for the installation and the operation of the KANNAD 406 AS ELT.

Servicing instructions are normally performed by shop personnel.

For servicing and maintenance instructions, refer to CMM 25-63-01.

FOR REGULATORY REQUIREMENTS, PLEASE CONSULT YOUR NATIONAL AVIATION AUTHORITY.

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SYSTEM OVERVIEW

1. COSPAS-SARSAT System

A. Description

Launched in the early eighties by the four founder countries (Canada, France, Russia, USA), the COSPAS-SARSAT system provides satellite aid to search and rescue (SAR) operations for maritime, aeronautical and terrestrial vehicles anywhere in the world.

It uses distress beacons fitted on mobiles and a constellation of LEO and GEO satellites which relay the 121.5 / 243 MHz signals and process the 406 MHz signal to ground stations (LUT) where the beacon positions are determined (with a precision of 10 NM with 121.5 / 243 signals and less than 2 NM with 406 signals).

Several types of beacons are designed to match the various applications of the COSPAS-SARSAT system:

- EPIRB (Emergency Position Indicating Radio Beacon) for maritime applications.
- ELT (Emergency Locator Transmitter) for aeronautical applications.
- PLB (Personal Locator Beacon) for land expeditions.

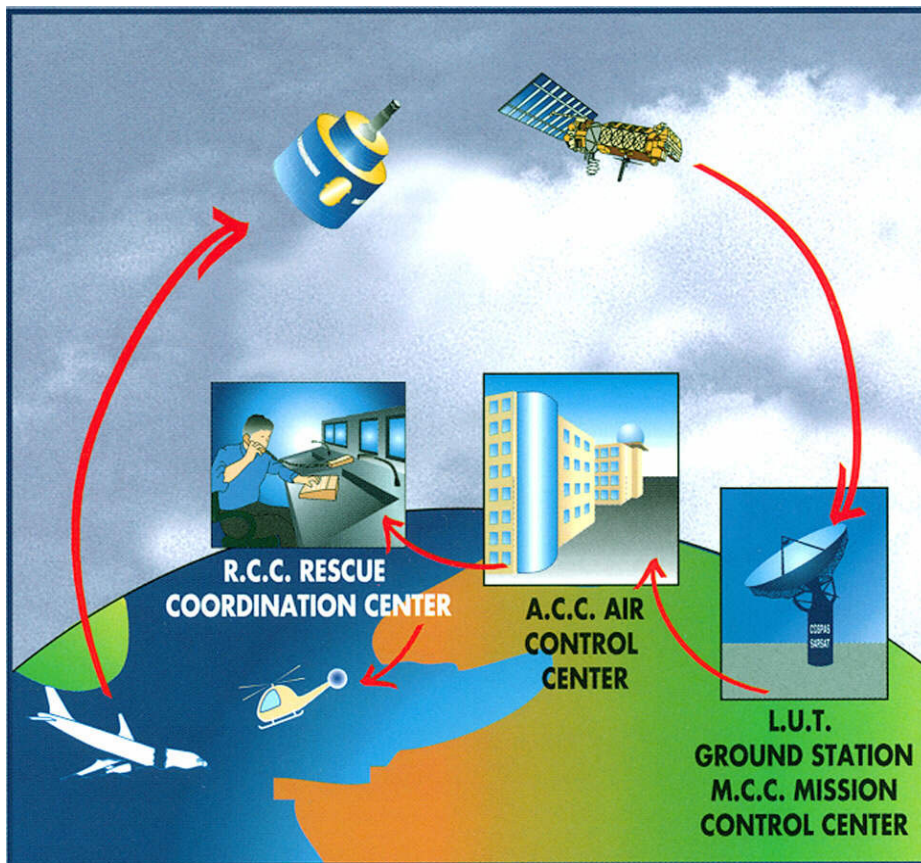


Figure 1: COSPAS-SARSAT System

B. World coverage with the COSPAS-SARSAT system

The major improvement is the use of the COSPAS-SARSAT system for processing aeronautical emergencies.

The difference with the 121.5 / 243 MHz is that the 406 MHz transmission carries digital data which enable the identification of the aircraft in distress and facilitate SAR operation (type of the aircraft, number of passengers, type of emergency).

The 406 MHz message is transmitted to the COSPAS-SARSAT satellites. This message is downloaded to one of the 64 ground stations (44 LEOLUTs and 20 GEOLUTS).

The aircraft is located by Doppler effect by the LEO satellites with a precision better than 2 NM (4 km) at any point of the earth.

C. Environmental improvements of ELTs

The certification of an ELT includes a range of severe mechanical tests:

- resistance to flame;
- impact and crush tests;
- resistance to shocks;
- watertightness;
- antideflagration;
- extreme temperatures (-20°C to 55°C for more than 48 hours).

2. KANNAD 406 AS Presentation

The KANNAD 406 AS is composed of:

1. a transmitter;
2. an optional mounting bracket (2a) and locking pin (2b);
3. a float;
4. an auxiliary antenna;
5. a water switch sensor (option);
6. a “Programming Dongle” for pin-programming function (option).

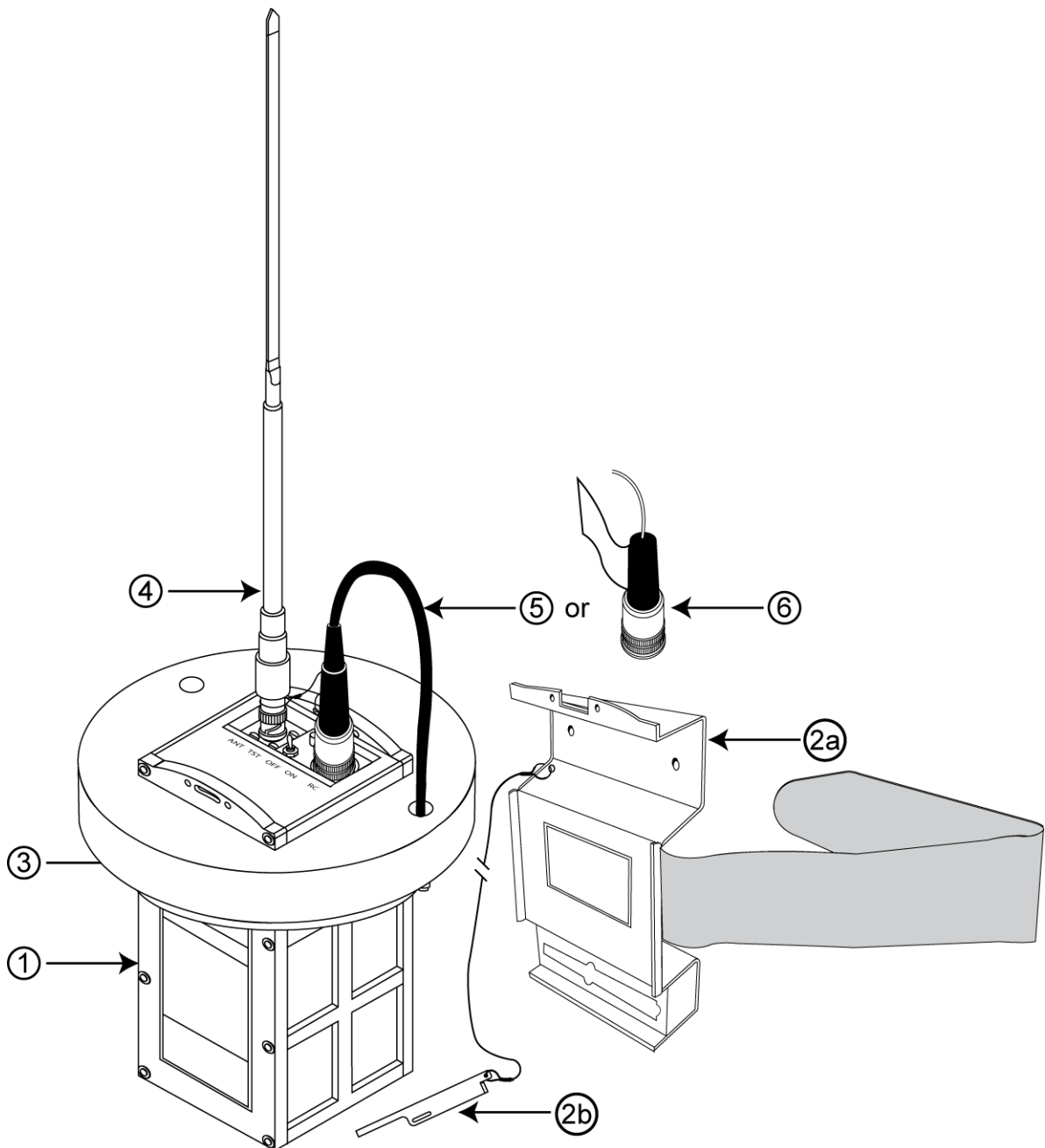


Figure 2: KANNAD 406 AS Presentation with Mounting Bracket AS

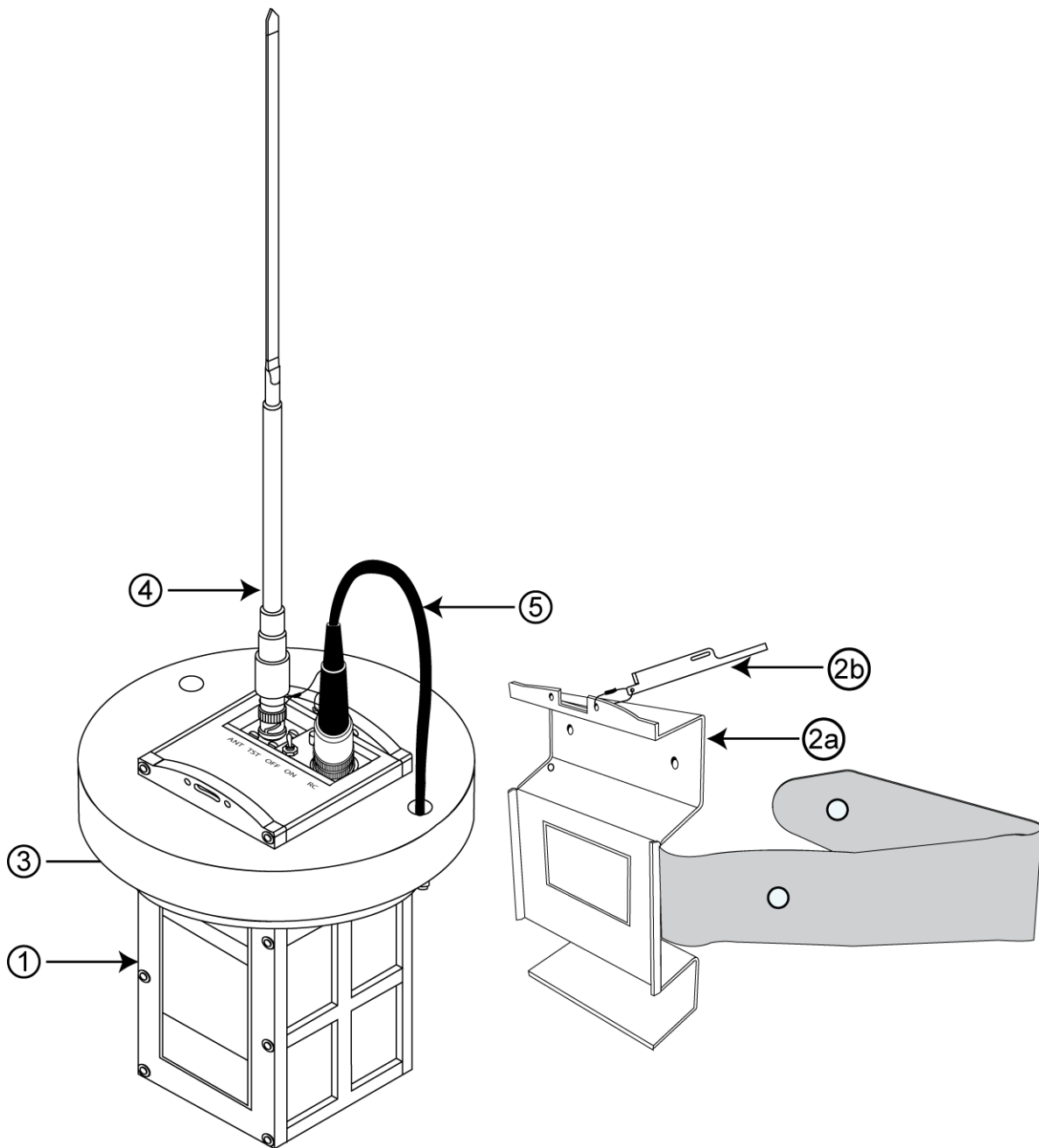


Figure 3: KANNAD 406 AS Presentation with Mounting Bracket AS-PLUS

NOTE: Mounting Bracket AS-PLUS cannot store a programming dongle. The Hook and Loop Fastener Strap used to retain the ELT is made of BMS8-285 Type IV Class2 material (BMS - BOEING MATERIAL SPECIFICATION), In addition it is fitted with snaps to secure the fixing method.

3. Design features

A. General

KANNAD 406 AS is a survival ELT intended to be removed from the aircraft and used to assist SAR teams in locating survivors of a crash.

KANNAD 406 AS is a standalone equipment equipped with an auxiliary antenna and activated manually by survivors or automatically by a “Water Switch Sensor” (optional) when in contact with water.

B. Mechanical design

KANNAD 406 AS is made of moulded plastic with excellent mechanical resistance (ASA/PC, light yellow colour).

The housing is designed to be easily taken in one hand. A tether is supplied to tie the ELT to a liferaft.

KANNAD 406 AS is fitted with a floating collar to enable the ELT to float upright if used in water. This floating collar can be removed if the ELT is attached to a life-raft or any buoyant part.

IMPORTANT: Unlike all other KANNAD 406 ELTs (automatic), KANNAD 406 AS (survival) is not fitted with a G-Switch (shock detector).



Figure 4: KANNAD 406 AS

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SYSTEM FUNCTIONAL DESCRIPTION AND OPERATION

1. Transmitter

The KANNAD 406 AS is designed to transmit on three frequencies (121.5, 243 and 406 MHz). The two basic aeronautical emergency frequencies (121.5 and 243 MHz) are mainly used for homing in the final stages of the rescue operations. The 406 MHz frequency is used by the COSPAS-SARSAT satellites for precise pinpointing and identification of the aircraft in distress.

Once activated, the transmitter operates continuously on 121.5 and 243 MHz. The output power is 100 mW on each frequency.

The modulation is an audio frequency sweeping downwards from 1420 Hz to 490 Hz with a repetition rate of 3 Hz.

During the 24 first hours of operation, a signal is transmitted on 406 MHz every 50 seconds to the COSPAS-SARSAT satellites. The output power on 406 MHz is near 5W.

2. Controls

The following controls are to be found on the ELT front panel (from left to right):

1. 3-position switch ARM/OFF/ON;
2. Visual indicator (red);
3. DIN 12 connector for dongle, water switch sensor, or programming equipment connection;
4. BNC or TNC connector for the antenna.

IMPORTANT: The switches are protected against inadvertent operation by a locking latch. To operate the switches, the lever shall be pulled to unlock then set to position.

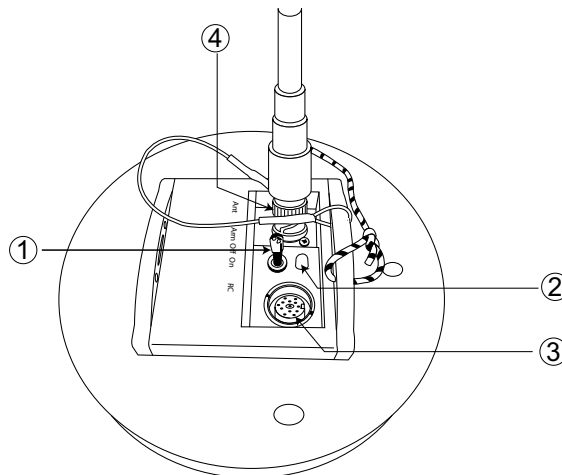


Figure 101: Front Panel

3. Working mode information

The visual indicator gives an indication on the working mode of the beacon:

- after the self test, a series of short flashes indicates the self test failed, one long flash indicates that the self test is OK.
- in operating mode, periodic flashes during 121,5 / 243 transmission and one long flash during every 406 MHz burst (1 every 50 seconds).

A buzzer gives aural information on the working mode of the beacon:

- continuous tone during self test;
- 2 beeps per second during 121.5 / 243 transmission;
- silence during 406 transmission.

4. Endurance

The energy is provided by a battery pack composed of 3 LiMnO₂ D cells (See pages 103 & 602 for Kit battery reference).

Lithium cells, lithium batteries and equipment containing such batteries are subjected to regulations and classified under class 9 as from 1st of January 2003.

The endurance of the 121.5/243 transmission is close to 100 hours at -20°C with new batteries.

In the worse conditions possible, a distress is pinpointed 5.5 hours maximum after the ELT activation and the position is subsequently updated (if necessary) every 2 hours.

As it is therefore preferable to keep the battery power for 121.5/243 MHz homing frequency transmission for the rescue operations, the 406 MHz transmission is deliberately stopped after 24 hours to extend the 121.5/243 MHz transmission for as long as possible.

The transmitter battery expiry date is fixed at 7 years from date of cell manufacturing (CDOM). If no activation of the ELT occurs during the battery lifetime, it shall be replaced before or at battery expiry date^(see note below).

NOTE: The expiry date takes into account FAR 91-207 (i.e. batteries to be replaced when 50 percent of their useful life has expired).

5. Technical Specifications

TYPE

- Three-frequency ELT
(121.5 / 243,0 / 406,025 MHz)
- Survival
- COSPAS-SARSAT Class 2
(-20°C to +55°C)

406 MHz TRANSMISSION

- Frequency: 406.025 MHz \pm 2 kHz
- Output power: 5W (37 dBm \pm 2 dB)
- Modulation type: 16K0G1D (Biphase L encoding)
- Transmission duration: 440ms (short message) every 50 sec.
- Endurance: Over 24 hours at -20°C

121,5/243 MHz TRANSMISSION

- Frequencies:
121.5 MHz \pm 6 kHz
243.0 MHz \pm 12 kHz
- Output power: 100 to 400 mW (20dBm to 26 dBm) for each frequency
- Modulation type: 3K20A3X
- Modulation rate: between 85 and 100%
- Frequency of modulation signal: 1420 Hz to 490 Hz with decreasing sweep
- Endurance: Over 48 hours at -20°C

CONTROLS

- ARM / OFF / ON switch
- Red visual indicator
- BNC antenna connector (S1823502-02)
- TNC antenna connector (S1823502-03)
- DIN12 connector for remote control, pin programming option and water switch sensor option
- Buzzer

BATTERY

KIT BAT300, P/N : S1820516-99
3 x LiMnO₂ D type cells for transmitter power supply
Expiry date: 7 years from date of cell manufacturing (CDOM)

HOUSING

Material: Molded plastic
Color: Yellow
Tightness: O-rings
Flotation: Yellow foam \varnothing 160mm \pm 5mm (6.3 In. \pm 0.196 In.)
Transmitter dimensions:

- 172 mm x 82 mm x 82 mm
(6.77 x 3.228 x 3.228 In.)

Overall dimensions (antenna deployed):

- max 590 mm x 160 mm x 160 mm
(23.228 x 6.3 x 6.3 In.)

Packed dimensions (in carry-off bag):

- Carry-off bag AS:
 - 332 mm x 180 mm x 180 mm
(13.07 x 7.086 x 7.086 In.)
- Carry-off bag Short:
 - 290 mm x 180 mm x 180 mm
(11.417 x 7.086 x 7.086)

Stowed dimensions (mounting bracket):

- 300 mm x 162 mm x 160 mm
(11.81 x 6.377 x 6.3 In)

Weight (incl. Auxiliary antenna, floating collar and batteries):

- typical 1180 g / max 1250 g
(2.6 lb / 2.75 lb)

Weight (mounting bracket):

- typical 165 g / max 175 g
(0.36 lb / 0.38 lb)

ENVIRONMENTAL CONDITIONS

RTCA DO-160D Ch. 4 to25
[ED62]XBA[ED62][RCC1]AWXXXXZXXX
ZWL[(A1)(A2)(A3)XX]XXA

Note: Ch. 6, 9, 10 according to DO-160C.

QUALIFICATIONS

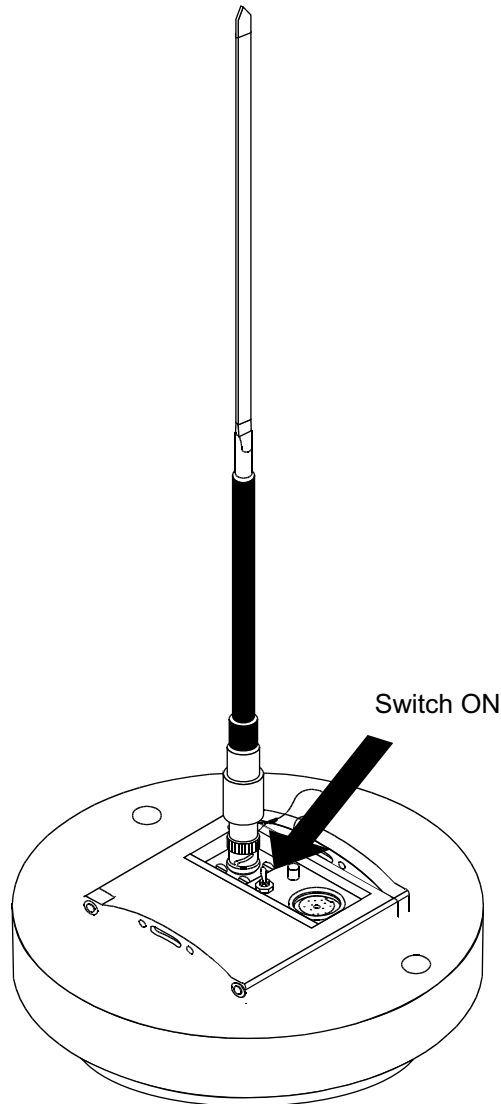
ETSO-2C91a & ETSO-2C126 (EUROCAE ED62)

TSO-C91a & TSO-C126 (RTCA DO183 & DO204)

6. Manual Activation

CAUTION: WHEN OPERATING THE ARM/OFF/ON SWITCH, PULL LEVER TO UNLOCK AND SET TO POSITION.

- Switch to “ON” position.

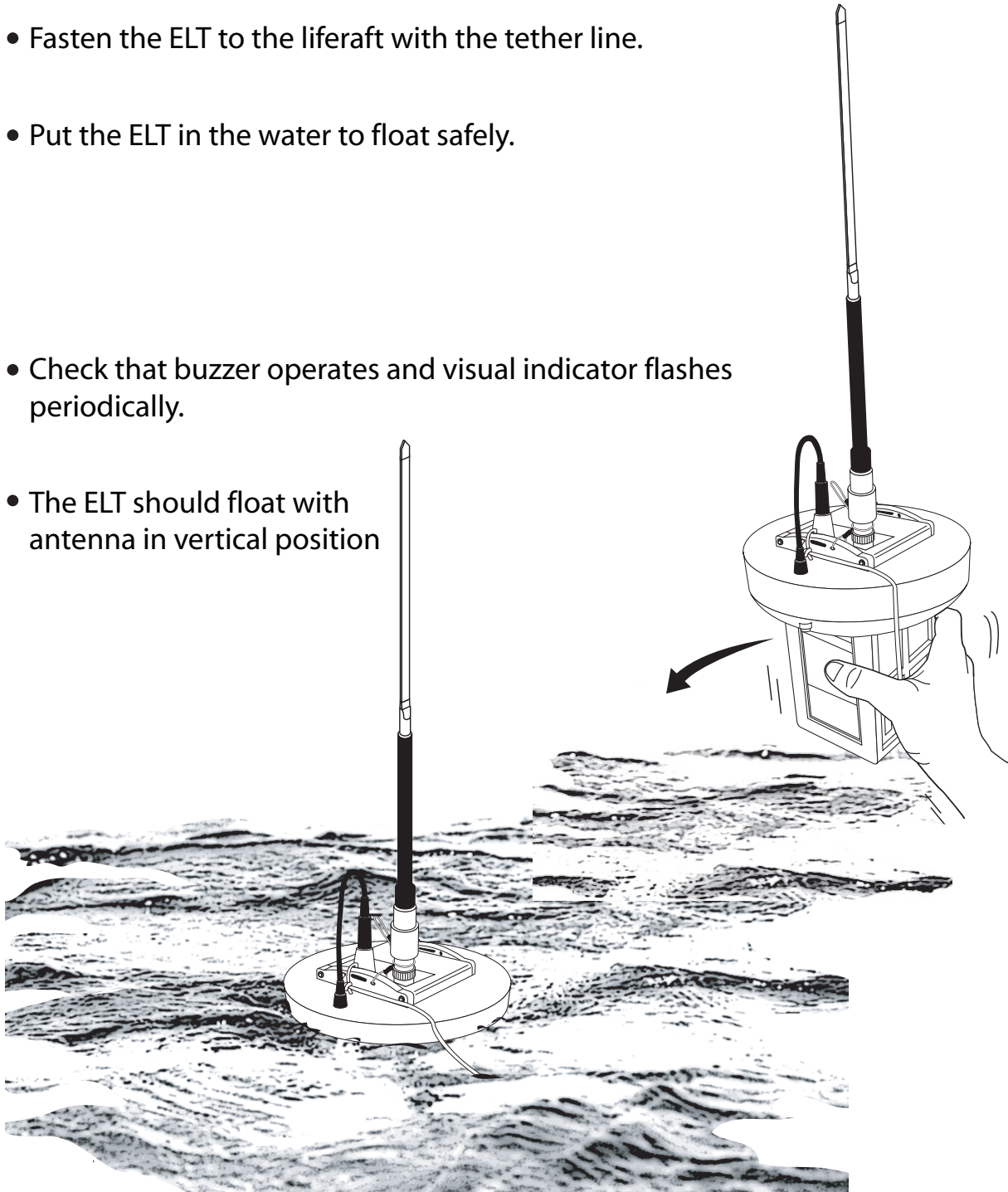


- Try to keep the antenna vertical.
 - The ELT starts with the self-test sequence.
 - 121.5 / 243 MHz transmission starts immediately after the self-test.
 - 406 MHz transmission starts after 50 seconds.
 - During transmission, buzzer operates and visual indicator flashes periodically.

7. Water Switch Activation

The ELT switch must be in the “ARM” position and the Water Switch Sensor must be connected.

- Fasten the ELT to the liferaft with the tether line.
- Put the ELT in the water to float safely.
- Check that buzzer operates and visual indicator flashes periodically.
- The ELT should float with antenna in vertical position



8. Reset

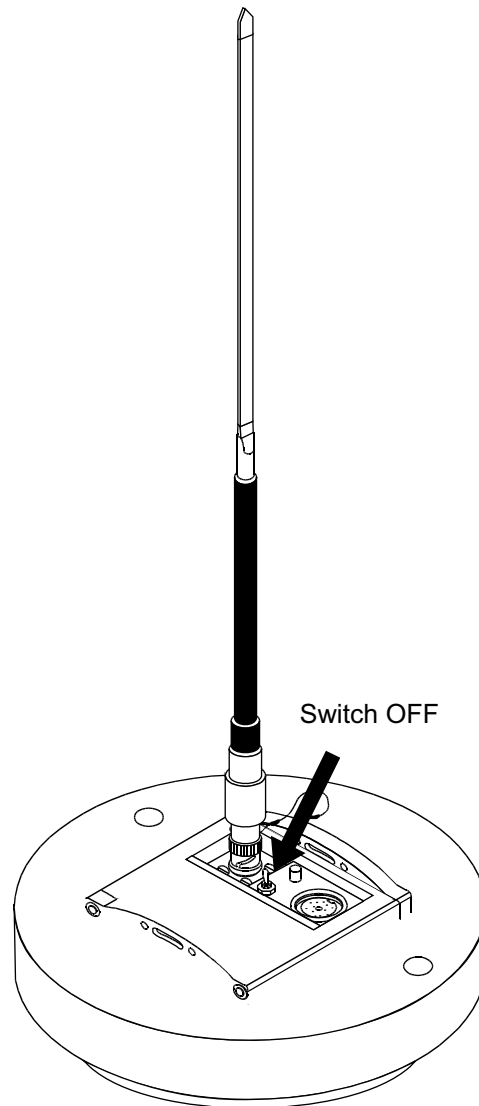
CAUTION: WHEN OPERATING THE ARM/OFF/ON SWITCH, PULL LEVER TO UNLOCK AND SET TO POSITION.

In case of unintentional activation, the ELT can be stopped manually.

No transmission must be interrupted unless every means are used to contact and inform the Air Traffic Controller of this action.

IMPORTANT: As 406 MHz transmission is effective 50 seconds after the ELT activation, if it is reset within this delay, no further radio contact will be necessary.

- Switch to "OFF".



INSTALLATION / REMOVAL

CAUTION: WHEN OPERATING THE ARM/OFF/ON SWITCH, PULL LEVER TO UNLOCK AND SET TO POSITION.

1. Registration and Programming

The ELT must be registered prior to installation on board.

The registration card available from the local registration authority must be completed and returned to this authority.

The “Programming Datasheet” (DIM0300) must be completed and returned to your distributor.

Any change of ownership shall also be declared and registered with the local registration authority and with the distributor.

The KANNAD 406 AS is fully compatible with the four programming protocols defined by the COSPAS-SARSAT C/S G005 document:

- Serialised Number.
- Aircraft 24 bit Address (the same as MODE S ATC or TCAS).
- Aircraft Operator Designator + serialised number up to 4096.
- Aircraft Nationality and Registration marking (Tail Number). This identification consists of up to 7 alphanumeric characters.

Programming of the ELT can be carried out either:

- by Orolia S.A.S. or the distributor (order must include programming details).
- in the shop with programming and test equipment (PR600 and e-Prog software).
- on board the aircraft with a programming equipment or programming dongle.

This operation takes less than 2 minutes and does not need any hardware operation. The identification is simply downloaded to the ELT when connected to a programming equipment via the DIN 12 connector.

NOTE: The DIN 12 connector shall be tighten by hand.

A. Pin programming option

The KANNAD 406 AS offers pin-programming capabilities to facilitate maintenance operations especially in the case of removals and/or replacement.

A special DIN 12 connector with a Serial Memory Module (called “Programming Dongle”) is connected to the ELT when installed on board (optional). This Programming Dongle contains the identification information of the aircraft and remains on board the aircraft. When an unprogrammed ELT is installed and connected to this Programming Dongle and the “ELT” is switched to “ARM”, it automatically updates its own memory with the identification data contained in the Programming Dongle memory.

When the ELT is removed from the aircraft, it keeps its identification data.

For maintenance purposes, it is possible to delete the identification information of the ELT by connecting a “Maintenance Dongle” to the ELT. Any accidental transmission with this “maintenance dongle” will not involve SAR operation as the identification code transmitted is recognized by COSPAS-SARSAT as “not on board”.

When a maintenance dongle is connected:

- Country code is **227** (France).
- Protocol is **Test**.
- Identification number is **SI + 5 digits** (the last 5 digits of CSN number) or **K + 6 digits** (the 6 digits of the CSN number).

If the pin programming option is selected by the operator, the following equipment are required:

- a “Programming Dongle” on each aircraft;
- a “Maintenance Dongle” on each ELT spare.

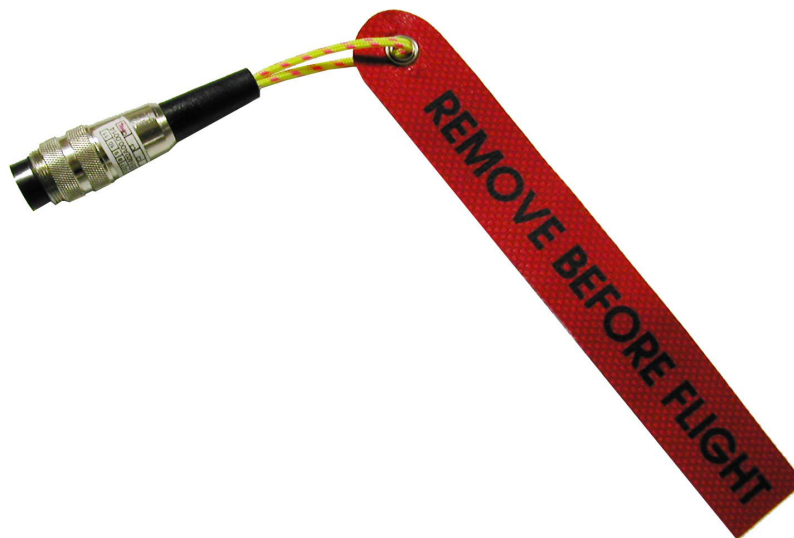


Figure 201: Maintenance Dongle

2. Installation

“The location of the ELT shall be chosen to minimise the potential for inadvertent activation, damage by impact, fire and contact by passengers or baggage” (RTCA DO-183)

“The ELT must be attached to the aircraft in such a manner that the probability of damage to the transmitter in the event of a crash impact is minimised.” (FAR 91.207)

The ELT shall not be installed less than 60 cm (2 ft) from a magnetic field sensor.

The KANNAD 406 AS can be either packed in a carry off bag or installed on a mounting bracket.

A. Installation with Carry-Off Bag

The KANNAD 406 AS is packed in a carry off bag with 3 handles for easy handling.

(1) Packing instructions

- Check that the switch is in the “OFF” position (“ARM” if the beacon is fitted with a water switch sensor).
- Slide the antenna through the hole provided in floating collar.
- Put the ELT with the antenna downwards so that it fits on lower part of the wedging foam.
- Turn it ¼ turn so that the antenna fits between top and bottom wedging foam.
- The ELT should wedge into place.

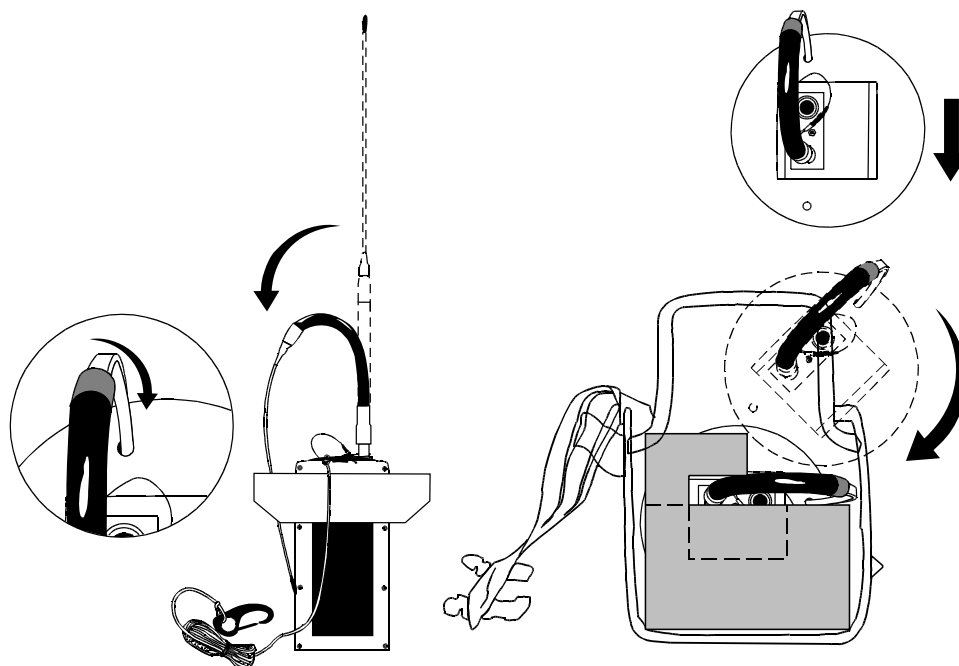


Figure 202: Packing Instructions

B. Installation with mounting bracket

(1) Brackets models

The mounting brackets are rectangular bases matching the exact shape of the ELT. They are fitted with a hook and loop fastener strap used to restrain the ELT during accident impact and with a locking pin to avoid accidentally switching the ELT in OFF position when installed in the mounting bracket

Two models of mounting brackets may be used:

- Mounting Bracket, AS, P/N S1820511-02; this mounting bracket is fitted with a foam used to store a dongle.

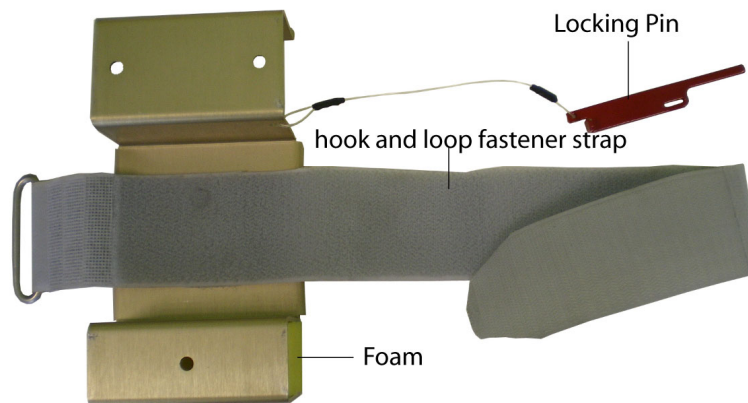


Figure 203: Mounting Bracket, AS, P/N S1820511-02

- Mounting Bracket, AS-PLUS, P/N S1820511-05; this mounting bracket is not fitted with a foam; no dongle can be stored. The hook and loop fastener strap is fitted with two snaps to secure the fastening of the strap.

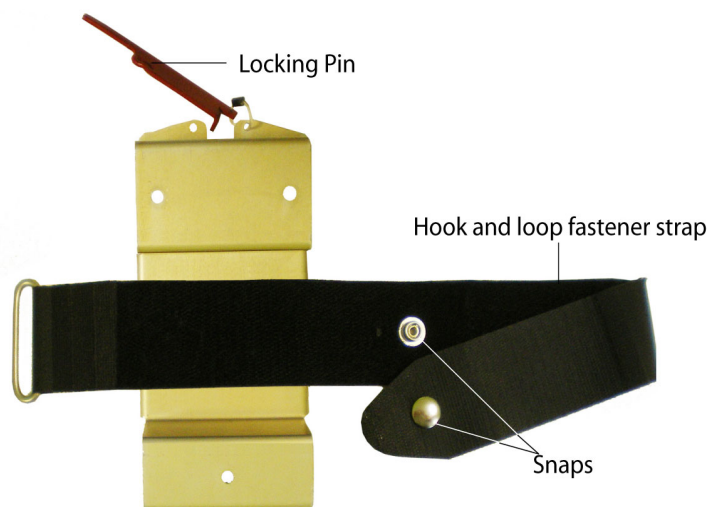


Figure 204: Mounting Bracket, AS-PLUS, P/N S1820511-05

(2) *Bracket installation*

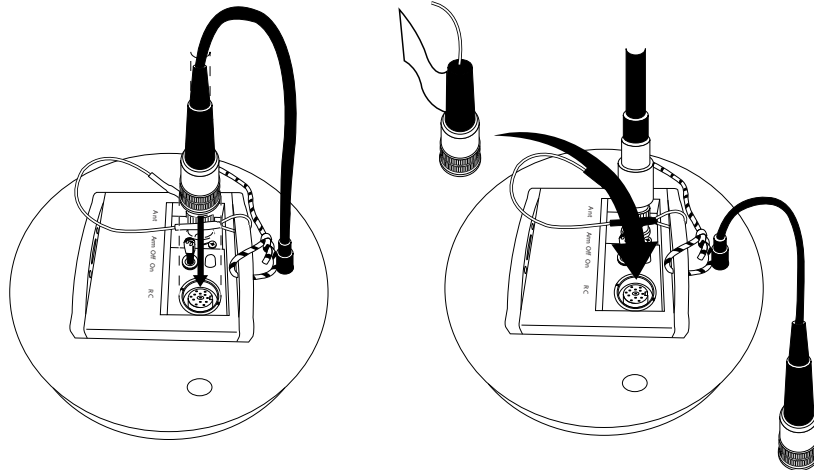
- Determine the location of the ELT on board according to FAR/RTCA recommendations.

CAUTION: DO NOT INSTALL THE ELT IN A LOCATION DIRECTLY EXPOSED TO THE SUN.

- Drill 3 holes Ø 5,5 mm in the aircraft structure according to “Drilling mask” page 503 of this document.
- Fix the bracket with the 3 screws and nylstop nuts or 3 rivets.

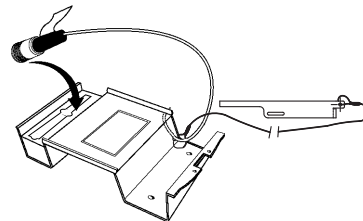
(3) *ELT installation*

- Check that the ELT identification label matches the aircraft tail number.
- If the mounting bracket is fitted with a Programming Dongle (P/N S1820514-01), remove the Water Switch Sensor connector (if any) and connect the programming dongle to the ELT.

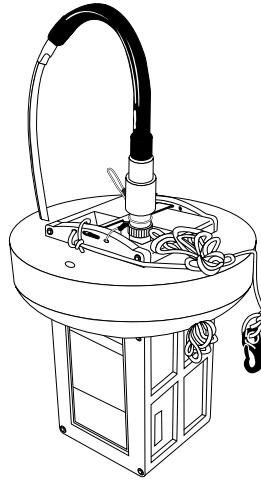


- Perform a Self-test (see paragraph “SELF-TEST”).
- If test result is OK, switch back to “OFF”.

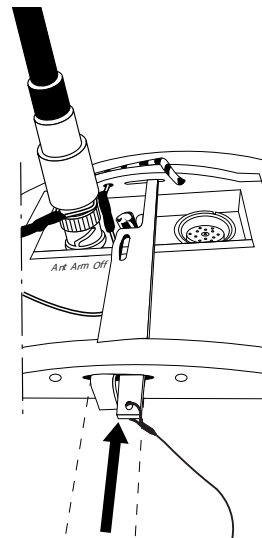
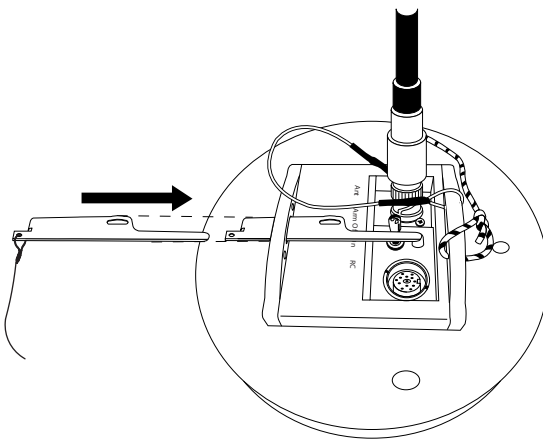
- Disconnect the Programming Dongle (if applicable) and stow it in the compartment designed to this effect inside the bracket.



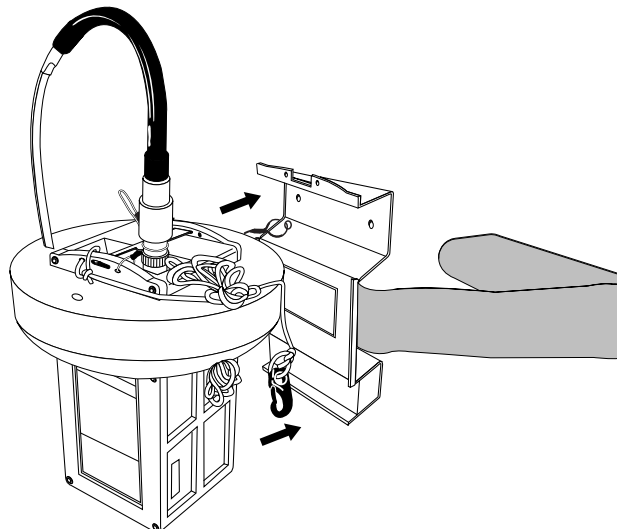
- Reconnect the Water Switch Sensor (if applicable).
- Slide the antenna through the hole provided in the floating collar.



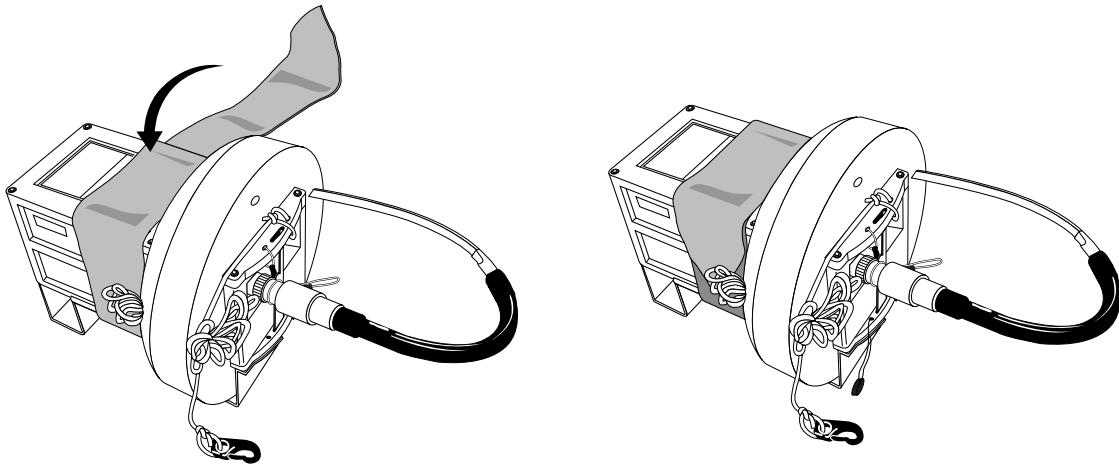
- Slide the locking pin as shown hereunder.



- Install the ELT on the mounting bracket with “lower cover” facing the mounting bracket.



- Fasten the hook and loop fastener strap tightly.



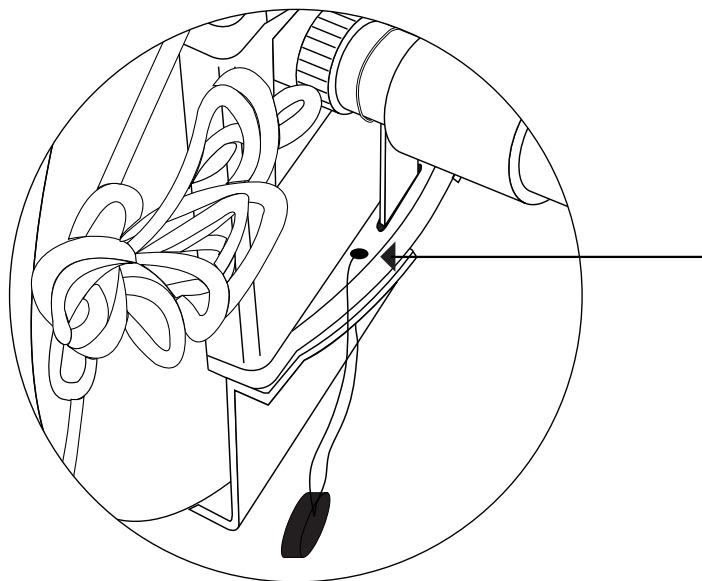
- When installed on mounting bracket S1820511-05, secure the hook and loop fastener strap by pressing the two snaps.
- If the ELT is fitted with a Water Switch Sensor (P/N S1820514-14), switch the ELT to the “ARM” position.

(4) Sealing

When installed, It is possible to seal the ELT on its bracket to prevent misuse. In case of an emergency, this seal must be weak enough to be broken manually without any special tool.

ELT shall be installed with locking pin so that switch cannot be put in the “ON” position (see **Installation**).

- Install a seal using one of the two holes in the cover of the ELT and the mounting bracket.

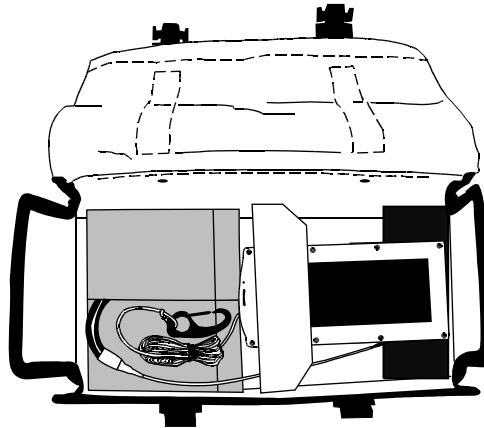


3. Removal

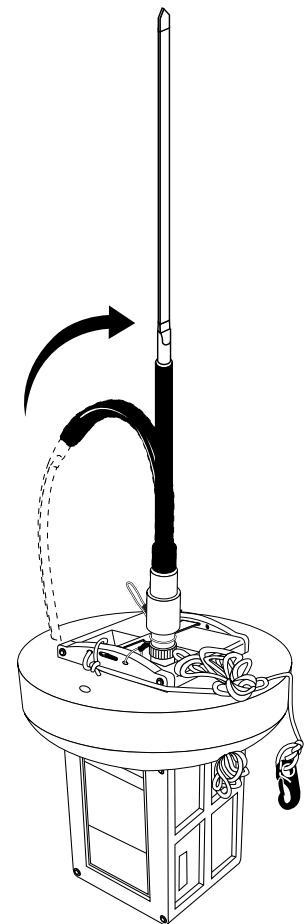
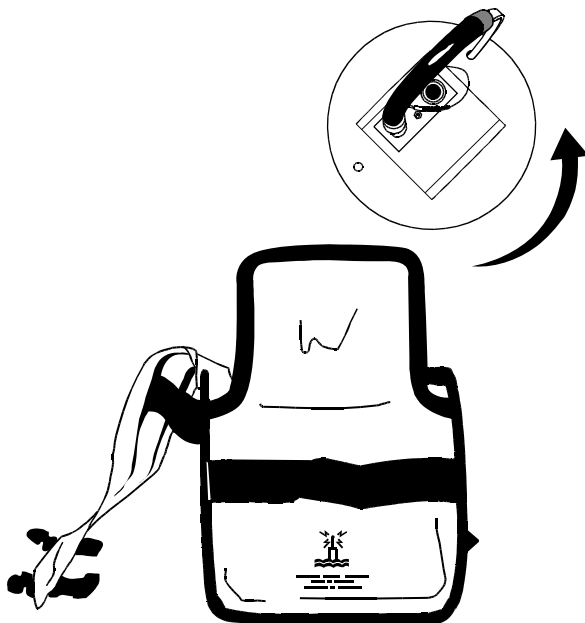
A. Deployment from carry-off bag

The ELT shall only be deployed in a safe area.

- Press the buckles to open the bag top cover.



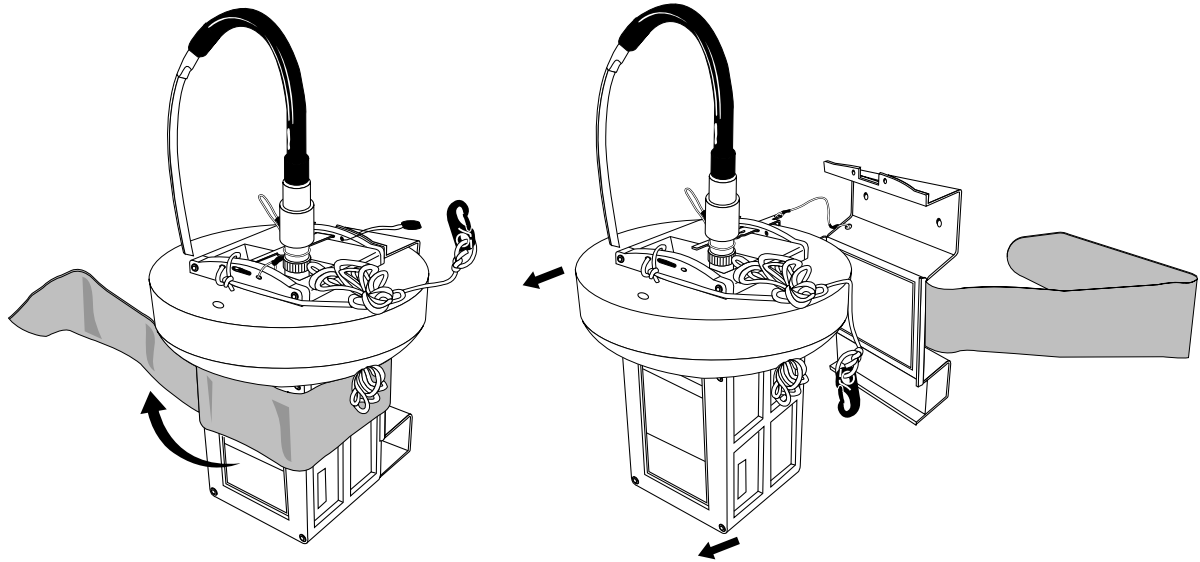
- Turn the ELT sideways to release it from the wedging form.



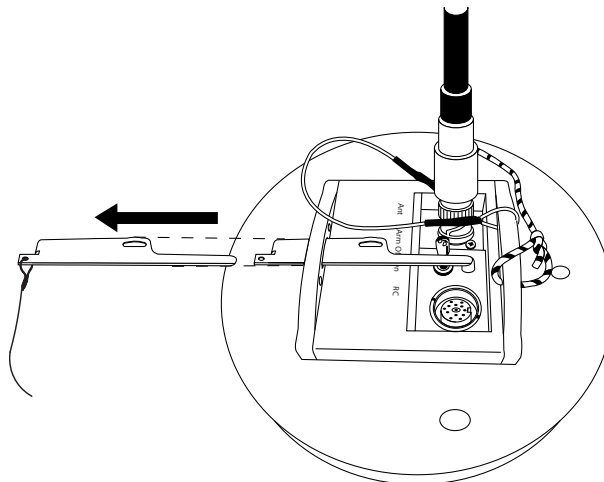
- Deploy the antenna and check that it is connected correctly.

B. Deployment from mounting bracket

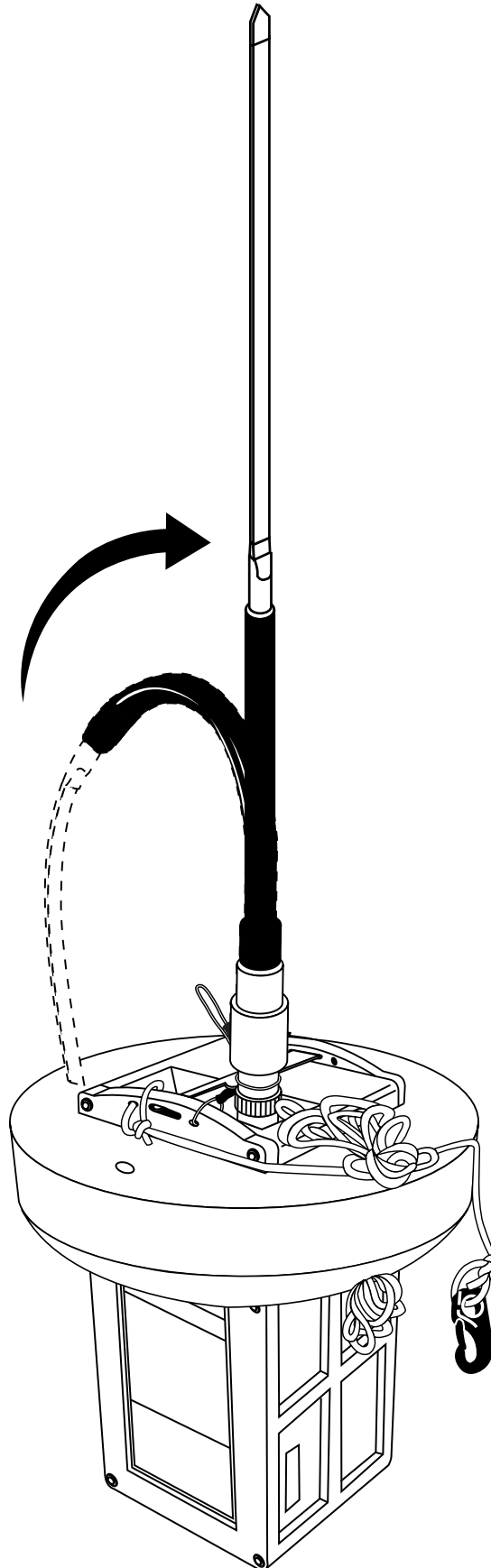
- Unfasten the hook and loop fastener strap.
- Remove the ELT with the antenna from the bracket.



- The locking pin will be extracted from the ELT while remaining attached to the mounting bracket.
- If, unfortunately, the locking pin was not extracted, slide it to have free access to the switch.



- Deploy the antenna and check that it is connected correctly.



CHECK

CAUTION: WHEN OPERATING THE ARM/OFF/ON SWITCH, PULL LEVER TO UNLOCK AND SET TO POSITION.

1. Self-test

A. Periodicity

It is recommended by the manufacturer to test the ELT to detect any possible failure.

It is recommended to perform a self-test once a month but it **should not be done more than once a week.**

However, each self-test consumes energy from the battery. Should self-tests be carried out more often than the maximum allowed, the battery life-time might be shorter than specified.

Do not perform Self-test without the antenna connected.

B. Self-test procedure

- Check that the antenna is connected correctly.
- If a programming dongle is fitted on the bracket, connect it to the ELT.
- Switch the ELT from “OFF” to “ARM”.
- The buzzer operates during the whole Self-test procedure.
- After a few seconds, the test result is displayed with the visual indicator as follows:
 - One long flash indicates that the beacon is operational and that no error conditions were found.
 - A series of short flashes^(see note below) indicates test failed.
- Switch back to “OFF” (or keep in the “ARM” position if the ELT is equipped with a water switch sensor).

**If self-test fails, contact the distributor as soon as possible.
Unless a waiver is granted, flight should be cancelled.**

NOTE: The number of flashes gives an indication of the faulty parameter detected during the self-test.

3+1	LOW BATTERY VOLTAGE
3+2	LOW RF POWER
3+3	FAULTY VCO LOCKING (FAULTY FREQUENCY)
3+4	NO IDENTIFICATION PROGRAMMED

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TROUBLESHOOTING

1. General

Procedure for fault isolation on board uses the visual indicator of the ELT's front panel. This visual indicator is activated by a self-test capability within the ELT.

Repair and battery replacement can only be carried out by PART 145 / FAR 145 avionics workshops (or equivalent agreement according to local regulations).

Additional approval from Orolia is required. Refer to Service Letter SL S18XX50X-25-02 Maintenance Policy for KANNAD ELTs.

2. Faults on Self-test

A. Visual Indicator

When the self-test is carried out, the number of flashes gives an indication of the faulty parameter detected during the self-test.

(1) 3+1 flashes

- Low battery voltage:
Check battery, refer to relevant CMM for test and repair.

(2) 3+2 flashes

- Low RF power:
Check 406 MHz power, refer to relevant CMM for test and repair.

(3) 3+3 flashes

- Faulty VCO locking (faulty frequency):
Check frequencies, refer to relevant CMM for test and repair.

(4) 3+4 flashes

- No identification programmed
Check programming, refer to relevant CMM for test and repair.

3. Other faults detected

A. Buzzer

(1) Buzzer does not operate

- Refer to relevant CMM for test and repair.

(2) Buzzer operates permanently when ELT in ARM mode

- Refer to relevant CMM for test and repair.

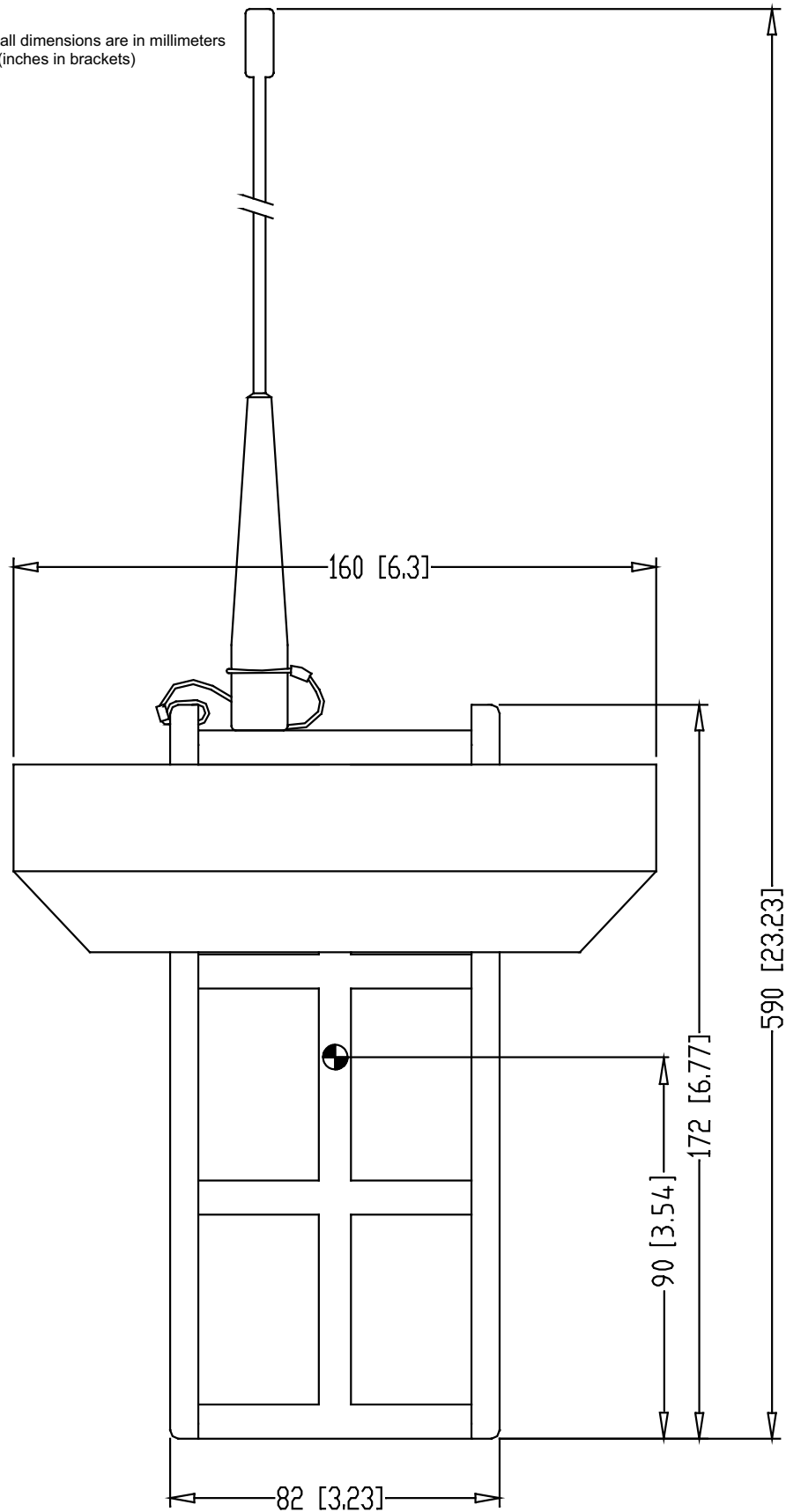
NOTE: for CMM download and other servicing instructions, refer to Service & Support section of Orolia's Web site: <https://www.orolia.com/support/>

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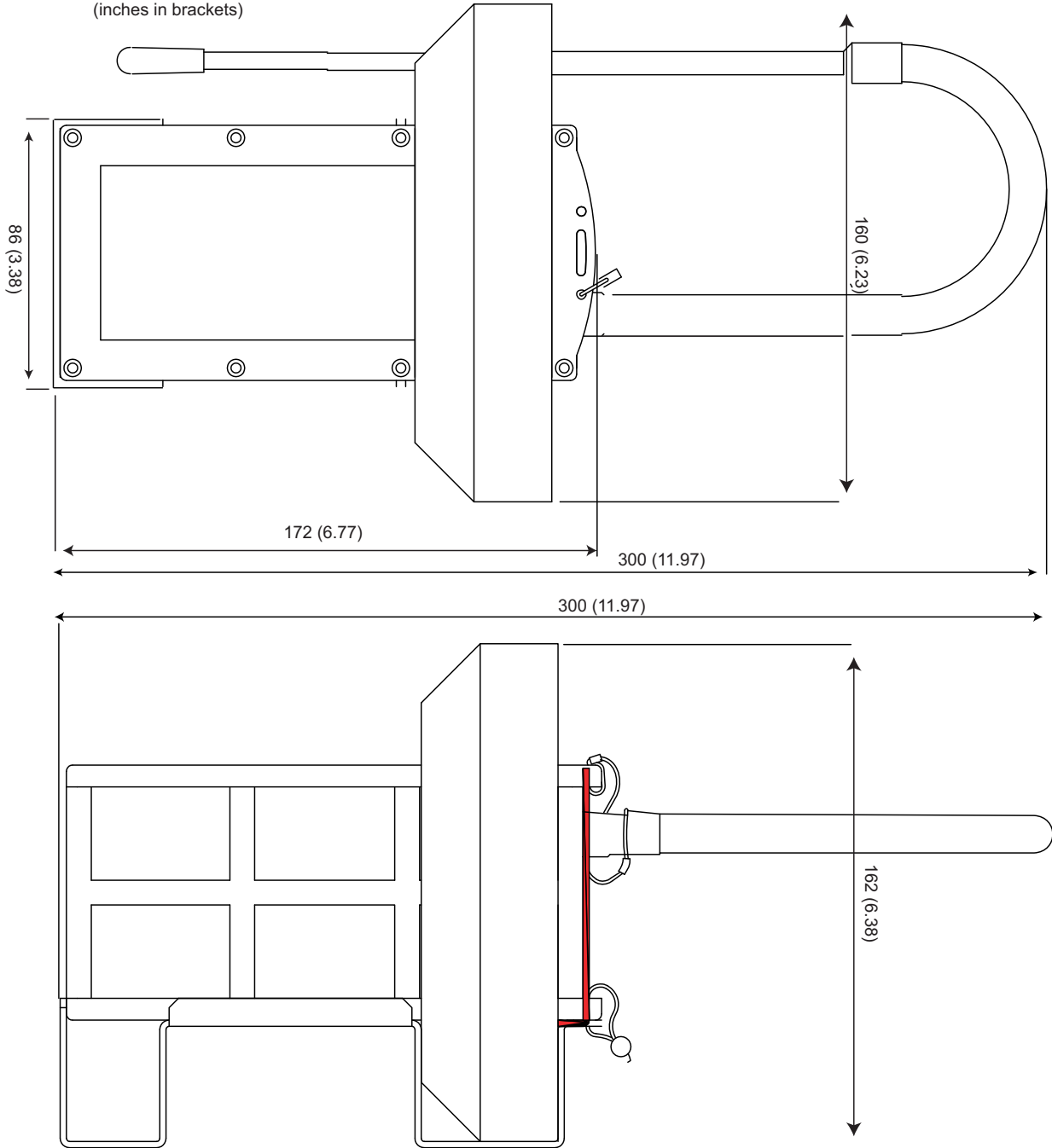
SCHEMATICS & DIAGRAMS

1. Outline Dimensions

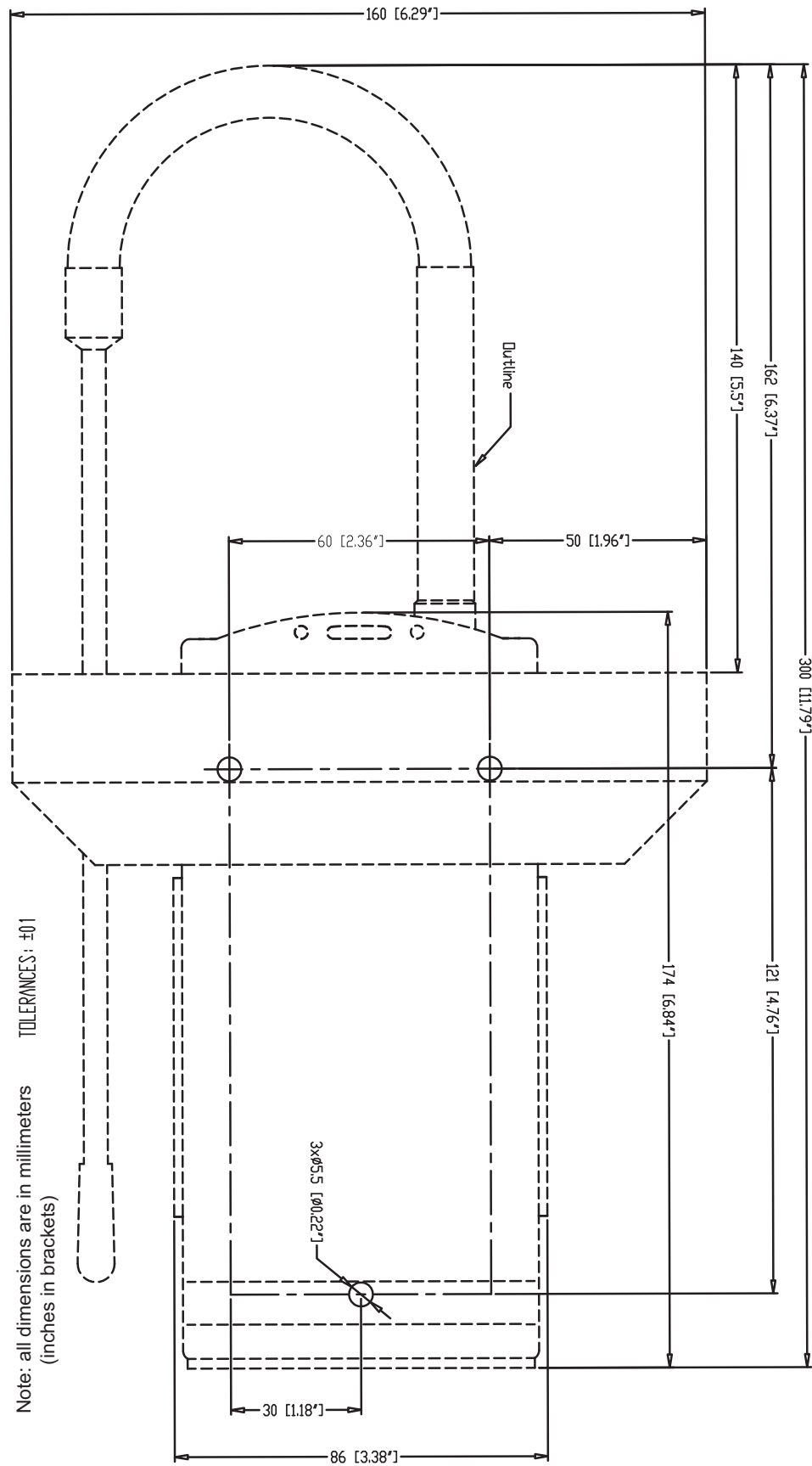
Note: all dimensions are in millimeters
(inches in brackets)



Note: all dimensions are in millimeters
(inches in brackets)



2. Drilling Mask



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SERVICING

1. Maintenance Schedule

Battery replacement:

carried out by a PART 145 or FAR 145 (or equivalent) maintenance station as described in Service Letter SL S18XX50X-25-02 Maintenance Policy for KANNAD ELTs.

Periodic inspection:

depending if the ELT is opened or not, PART 145 or FAR 145 (or equivalent) may be required. Refer to local regulations

A. Periodic inspection

Note: (if required by the relevant Civil Aviation Authority).

Some Civil Aviation Authorities may require the ELT be tested periodically. In this case, refer to Service Letter SL S18XX502-25-12 “Guidelines for periodic inspection” available on the Support section of Orolia website.

B. Battery replacement

Testing of the various elements of the ELT is mandatory when the battery is replaced:

- For battery replacement intervals, [Refer to 2. Battery replacement requirements](#), page 602.
- The testing procedure associated with the battery replacement is described in the level 2 CMM 25-63-05.

For CMM download and other servicing instructions, refer to the Support section of Orolia website: <https://www.orolia.com/support/>.

2. Battery replacement requirements

Battery replacement is mandatory:

- after more than 1 hour of real transmission (cumulated duration);
- before or on the battery expiration date;
- after use in an emergency;
- after an inadvertant activation of unknown duration.

Only original and approved battery pack included in battery KIT BAT300 supplied by Orolia S.A.S. can be installed.

The battery replacement can only be carried out by a Kannad Approved Service Center.

For more information, refer to Kannad ELT Maintenance Policy available on Orolia website.

Orolia S.A.S. refuses all responsibility and invalidates all warranty should unapproved maintenance be carried out.

List of KANNAD Battery Replacement Center is available on our Website:

<https://www.orolia.com/support/>

Orolia S.A.S.

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Support: <https://www.orolia.com/support/>

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NOTES

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