SIMRAD

PRO SERIES

SA70 RADAR SART
User Guide

ENGLISH

Preface

As Navico is continuously improving this product, we retain the right to make changes to the product at any time which may not be reflected in this version of the manual. Please contact your nearest distributor if you require any further assistance.

It is the owner's sole responsibility to install and use the equipment in a manner that will not cause accidents, personal injury or property damage. The user of this product is solely responsible for observing safe boating practices.

NAVICO HOLDING AS AND ITS SUBSIDIARIES, BRANCHES AND AFFILIATES DISCLAIM ALL LIABILITY FOR ANY USE OF THIS PRODUCT IN A WAY THAT MAY CAUSE ACCIDENTS, DAMAGE OR THAT MAY VIOLATE THE LAW.

Governing Language: This statement, any instruction manuals, user guides and other information relating to the product (Documentation) may be translated to, or has been translated from, another language (Translation). In the event of any conflict between any Translation of the Documentation, the English language version of the Documentation will be the official version of the Documentation.

This manual represents the product as at the time of printing. Navico Holding AS and its subsidiaries, branches and affiliates reserve the right to make changes to specifications without notice.

Copyright

Warranty

The warranty card is supplied as a separate document.
In case of any queries, refer to the brand web site of your display or system:
pro.simrad-yachting.com
www.simrad-yachting.com

Warning / Important

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

ATTENTION

OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

CAUTION!

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

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, and 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.

Contents

1 GMDSS Requirements

Simrad GMDSS products are manufactured and approved to be compliant with relevant IMO/ SOLAS (Safety of Life at Sea) Regulations and requirements. The SOLAS GMDSS regulations are structured such that all GMDSS ships are required to carry a minimum set of equipment, with (basically) more equipment being required the further the ship travels from land. GMDSS requirement for SART (Search and Rescue Locating Device) according to SOLAS:

Chapter III, Regulation 6
2.2 Search and rescue locating devices

At least one search and rescue locating device shall be carried on each side of every passenger ship and of every cargo ship of 500 gross tonnage and upwards. At least one search and rescue locating device shall be carried on every cargo ship of 300 gross tonnage and upwards but less than 500 gross tonnage. Such search and rescue locating devices shall conform to the applicable performance standards not inferior to those adopted by the Organisation*. The search and rescue locating devices** shall be stowed in such location that they can be rapidly placed in any survival craft other than the life raft or life rafts required by regulation 31.1.4. Alternatively one search and rescue locating device shall be stowed in each survival craft other than those required by regulation 31.1.4. On ships carrying at least two search and rescue locating devices and equipped with free-fall lifeboats one of the search and rescue locating devices shall be stowed in a free-fall lifeboat and the other located in the immediate vicinity of the navigation bridge so that it can be utilized on board and ready for transfer to any of the other survival craft.

_____

* Refer to the Recommendation on performance standards for survival craft radar transponders for use in search and rescue operations, adopted by the Organization by resolution MSC.247(83) (A.802(19)), as amended) and the Recommendation on performance standards for survival craft AIS Search and Rescue transmitter (AIS SART), adopted by the Organization by resolution MSC.246(83).

** One of these search and rescue locating devices may be the search and rescue locating device required by regulation IV/7.1.3.

Regulation 26
- Additional requirements for ro-ro passenger ships 2 Life rafts

2.5 Life rafts carried on ro-ro passenger ships shall be fitted with a search and rescue locating device in the ratio of one search and rescue locating device for every four life rafts. The search and rescue locating device shall be mounted inside the life raft so its antenna is more than one metre above the sea level when the life raft is deployed, except that for canopied reversible life rafts the search and rescue locating device shall be so arranged as to be readily accessed and erected by survivors. Each search and rescue locating device shall be arranged to be manually erected when the life raft is deployed. Containers of life rafts fitted with search and rescue locating devices shall be clearly marked."

Chapter IV, Regulation 7- Radio Equipment- General

Every ship shall be provided with:
- .3 A search and rescue locating device capable of operating either in the 9 GHz band or on frequencies dedicated for AIS, which:

    o .3.1 shall be so stowed that it can be easily utilized; and
    o .3.2 may be one of those required by reg. III/6.2.2 for a survival craft

SA70 is also compliant with relevant sections in these regulations/ requirements:*
- SOLAS 74 as amended, Regulation III/6.2.2, IV/7.1.3, IMO Res. MSC.97 (73) 14.7.1.3, MSC.247(83), IMO Res. A.530 (13), IMO Res. A.802 (19), IMO Res. A.694 (17), ITU-R M.628-3 (11/93), IEC 61097-1:1992, IEC 61097-1(2007), IEC 60945:1996 and IEC 60945 ed.4:2002
- IMO Resolutions MSC.256(84)
- COMSAR/Circ.32
- European Directive 2009/26/EC
- Other national certifications/requirements

General Description

SA70 is emergency equipment consisting of:
- SA70 radar transponder.
- Mounting rope for life rafts / life boats.

The 9 GHz radar transponder type SA70 is developed to meet the rules and regulations for use on vessels and life rafts in the maritime service. SA70 meets the specifications for 9 GHz radar transponders for use in search and rescue operations at sea.

The operating range of the SA70 is up to 30 nautical miles, depending on the height of the electronic unit and the radar height of the search and rescue unit (sea or airborne). With a radar height of 20m and the SA70 placed at 1m above sea level, the range will be up to 10 nautical miles. SA70 is buoyant, however to obtain maximum performance the transponder should be placed in a vertical position and as high up as possible in order to achieve maximum coverage. Several mounting brackets and mounting aids are available to ensure correct mounting and use of the radar transponder.

The purpose of the SA70 is to perform a secondary alarm when search and rescue units are searching for a life raft / lifeboat in distress. The SA70 will help the units to pinpoint exactly where the distressed boat is located in a larger area. This is done with the help of the radar on the searching ship or helicopter.

When the SA70 is interrogated (hit) by a radar signal, it will immediately start to transmit a number of sweeps covering the complete maritime 3 cm radar band. These sweeps are detected on the radar screen and are used to navigate directly towards the distressed life raft, for details on radar display see chapter 5.3. Maximum distance to a ship will normally be about 10 nm and approximately 30nm to a helicopter, dependent on the helicopters altitude. The transponder will not give any alarms further away than this.

The primary alarm will usually be an Emergency Position Indicating Radio Beacon (EPIRB) or distress call on VHF / HF - manual or via digital selcall.

The SA70 should be activated immediately after activation of the EPIRB or by instruction from the rescue control centre. The batteries of the SA70 will last at least 96 hours in standby after activation and then minimum 8 hours of continuous operation.

Although the transponder does not send any alarm via satellite, VHF or other radio communication, the use should be limited to short tests and emergency situations. This is to save battery capacity in case of a situation where the transponder is needed.

SA70 Features

Watertight:
SA70 is watertight to a depth of minimum 1 meter.

Buoyant:
SA70 is buoyant in case the transponder is accidentally dropped into the water. To increase coverage the SART70 should always be held or mounted as high as possible.

Rugged design:
The SA70 will withstand a drop from 20 meters into the water. It is resistant to seawater, oil and sunlight.

Handling:
SA70 is designed for easy operation, with a brief operating instruction printed on the unit. It comes standard with a 10 meter rope and a shackle hook to be used for hanging the SART70 on the inside of a life raft.

Indicators:
SA70 is equipped with an LED and a built in buzzer to indicate operation.

The LED will normally give a flash each 4 seconds to show that the SA70 is activated.

When a search and rescue unit is approaching the buzzer will sound each time the SART70 is hit by the radar. A continuous sound from the buzzer means that the ship or helicopter is close to the SA70 and the radar is hitting the SA70 continuously.

Battery unit
The battery module is to be replaced every 5 years. A battery expiry label on the SA70 housing displays the expiry date. A new battery comes complete with cable and connector.

2 Functional Description

General

SA70 consists of a housing sealed at the lower end with a bottom lid and may be split into the following main parts:

- Bottom lid
- Housing with SA70 electronic assembly and battery module. The housing is made of glass reinforced polycarbonate

See "Drawings" on page 21 onwards.

SA70 Electronic Assembly

SA70 electronic assembly is inserted into the SA70 housing. It consists of the transceiver module and antenna.

- Transceiver Board in metal box
- Antenna (9 GHz).

See illustrations in "SA70 Electronic Assembly" on page 21.

Battery Module

The battery module is inserted into the SA70 housing. A battery expiry label on the SA70 housing displays the battery expiry date.

A new battery module comes complete with cable and connector and can be changed by opening the bottom lid of the SA70. See "Replacing The Battery Module" on page 17.

See illustrations in "Battery Module" on page 21.
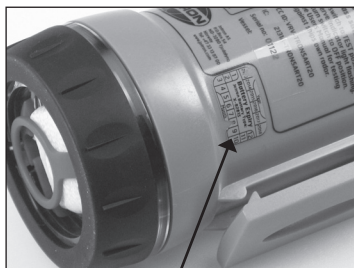
Battery expiry label

Bottom Lid

The Bottom lid includes four items:

1. The winder hook
2. The screw ring
3. The light tower
4. The O-ring

See illustrations in "Bottom Lid" on page 22.

3

Installation

SA70 can be mounted several ways; near the vessels emergency exit, normally in the wheelhouse at the starboard or port exit (or both, depending of requirements) and inside life raft or lifeboat. (See "GMDSS Requirements" on page 5).

Brackets

There are 3 different mounting brackets available.
- Wall bracket
- Lifeboat bracket (optional)
- Pole (optional)

Wall Bracket

A wall bracket is delivered with the SA70 and should be used for storage of the transponder. The bracket should preferably be mounted in a vertical position and in a place where the SA70 is easily available in case of an emergency.

See illustrations in "Wall Bracket" on page 22.

Life Boat Bracket (Optional)

The outdoor lifeboat bracket should be mounted vertically on the roof of the lifeboat (as high as possible). SA70 shall not be permanently stored in this bracket if mounted outside a freefall lifeboat, but moved to this bracket after lifeboat is deployed in water.

Activate the transponder and put it into the bracket. Secure the transponder to the bracket. The bracket will fit a pipe with a maximum diameter of 50 mm.

See illustrations in "Lifeboat Bracket" on page 23.

Using The Telecopic Pole

A telescopic pole can be used to extend the height of the SA70, inside or outside the life raft/boat. Simply extend the attached pole to the full length (app. 1,2 m from the top of the SA70). Make sure that the rod is locked by pulling hard when it is fully extended. The rod can now be fastened or held by a person. Ensure the rod is held as vertical as possible when activating the SA70.

May be used for mounting inside a life raft (optional).

4 Operation

SA70 should be installed according to the descriptions in "Installation" on page 11 onwards. In a distress situation, the SA70 should be carried from its storage position to the life raft/lifeboat.

Activating SA70

- Break seal at switch.
- Pull locking pin and make sure that the switch enters the "ON" position. An audible "BEEP" will be heard and the indicator led will start to flash every 4 sec
- Place (or hold) the transponder in a vertical position as high as possible. When the SA70 is within range of an active 3 cm radar x-band, the internal loudspeaker will be activated. A handheld VHF radio should now be used to establish contact with the approaching boat or helicopter.

After activating the SA70, it shall be mounted in lifeboat/life raft as illustrated in "Examples of usage in life boat/liferaft" on page 25.

Deactivating SA70

- Move the switch to the "OFF" position.
- Replace the locking pin.

Examples of usage in lifeboat/liferaft

See illustrations on "Examples of usage in life boat/liferaft" on page 25.

SART Pocket

There are different ways of mounting a SA70 in an inflatable Life Raft:

It is often a SART pocket where the SA70 may be lifted to the canopy after deploying the raft
- Put the SART70 into the SART pocket.
- Lift the pocket by its rope to the canopy

Life Raft Mounting Strap

We can supply a "SART Life-raft mounting strap" as seen on the attached pictures to be mounted to the inflatable canopy.
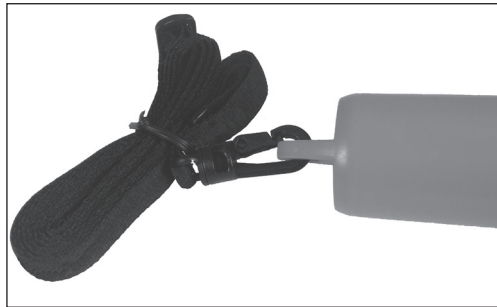
- Attach the strap as seen on picture above
- Fasten the other end to the canopy.

SART Pole Mounting

You may use the 1m Pole arrangement.
- Attach the pole to SART70
- Extend the pole to its full length and make sure it is "locked"
- Lift it up through the tent air tube (if available) and secure using the life rafts mounting for SART pole (strap, rope etc.)

10 m Reel With Lanyard

The last solution is to use the 10 m lanyard. See illustrations in "10 m reel with lanyard" on page 25.

- Remove the lanyard reel as seen on picture above
- Roll out the lanyard from the reel
- Thread it through the fastening ring of the top of the SART70
- Lift SART70 to the canopy and fasten it

Test of SA70

Test of the SA70 is done using the ships own 3 cm X-band radar. The radar display will show different patterns depending on the range to the transponder. See "Test of SA70" on page 26 for details of the radar display. Note that the examples shown are typical and will vary with the radar performance (height, power output and sensitivity).

With the transponder 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 ship construction and other obstacles, and does not indicate an error in the transponder. Placing it further away will reduce the signals to 12 dots on the radar display, showing the direction to the transponder.

Modern radars often have special function that will optimize reception of radar SART, either in TEST or ON. If the Radar has such function, the Radar is detuned out of best tuning condition, and erases or weakens all normal radar echoes, but 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, a text "SART" is shown at the bottom of the display.

Note! Make sure that the SART feature is turned off when SART detection is no longer necessary

- Hold the switch on the SA70 in the "TEST" position.
- Simultaneously a person should observe the radar display to check for correct pattern. The radar should be set for a 10 nm range.
- The test should preferably be done in open sea to avoid interference on the radar display from land echoes.
- Alternatively, a radar of a nearby ship can be used to test the transponder. A ship to ship VHF channel should then be used to confirm operation.

See illustrations on "Test of SA70" on page 26.

CAUTION!

While the SA70 is activated it will respond to any 3 cm radars within range. Tests must be made as short as possible (5 min) to avoid interference and to avoid wasting battery capacity.

Maintenance and Troubleshooting

5

Maintenance

SA70 requires the following maintenance:

At least every 6. month

The transponder should be taken out of its bracket and tested against a radar, using the procedure in chapter 5. Either the ships own radar could be used or the radar of a nearby ship. Note that the self test use the internal battery and will reduce the operational lifetime of the equipment - therefore the test should be limited to not more than once every month.

Every 5. year

The battery unit must be replaced every 5 year. Storage of batteries over a long period of time will reduce their capacity. To ensure long and reliable operation the battery unit must be replaced every 5 year. The battery replacement can be performed on board using the procedure in on the next pages.

Replacing The Battery Module

Below is a description on how to change batteries on SA70.

Disassembly

Twist the rubber grip anti-clock-wise to remove the lid

It might be difficult to remove the lid. If so, remove the rubber grip first

And then twist off the lid

Opened
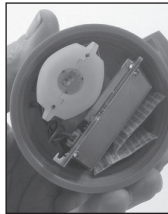
Rubber holder below battery and electro-nics removed

Pull out the bat-tery
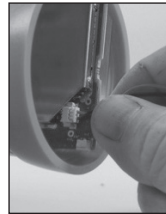
Pull out the cable from connector
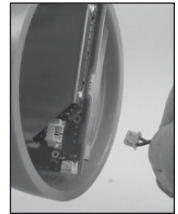
Remove old Silaca gel bags

Assembly

Install the new battery. Make sure the cable is within the guide
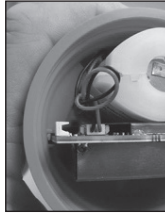
Connect cable to electronics, black= left, red= right

Add 2x5 g Silica gel bags

Mount rubber holder

Remove old O-ring using a Credit Card

Use acid-free Vaseline on the new O-ring
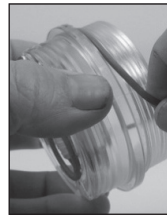
Fit the new O-ring

Reinstall lid- tighten without tools

Replace the rubber grip

Assembly completed

Battery Disposal

Dispose in accordance with applicable regulations, which vary from country to country.(In most countries, the disposal of used batteries is regulated and end-users are invited to dispose of them correctly, 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.

Incineration

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

Land Filling

Leachability regulations (mg/l)

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

Recycling

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

6 Spare Parts/Accessories

SA70 Main unit	part.no: 000-10728-001
Lifeboat bracket	part.no: 000-10731-001
Pole bracket	part.no: 000-10732-001
Battery, SA70, 5 years maintenance kit	part.no: 000-10733-001
Bulkhead bracket	part.no: 000-10730-001

7

Technical Specifications

Electrical Specifications

Frequency:	X-band (3 cm) (9.2 - 9.5 GHz)
Temperature range:	Operating: -20 to +55°C
	Storage: -30 to +65°C
Radiated power:	> 400 mW e.i.r.p (+26 dBm)
Sweep type:	12 sweep sawtooth type
	Forward 7.5 us ±1 ms
	Return 0.4 us ±0.1 ms
	Starts with return sweep
Receive sensitivity:	Better than -50 dBm e.r.s.
Response delay:	Max 0.5 ms
Antenna pattern:	Horizontal polarization
	Omni directional radiation in the horizontal plane.
	Greater than ±12.5 degrees elevation angle in the vertical plane
Battery:	Lithium metal 7,2V/3600 mAh
	5 years service life.
Battery capacity:	96 hours standby +8 hours continuous operation when activated by a radar with 1 kHz prf at -20°C.
	5 years storage

Mechanical Specification

Materials used:
- Transponder housing: Glass reinforced polycarbonate
- Bracket: Anodized aluminum

Transponder dimensions:

	Max diameter:	89 mm
	Length:	250 mm
	Weight:	482 g

Transponder with standard storage bracket:

	Max diameter:	90 mm
	Length:	250 mm

8 Drawings

General - SA70 AIS SART Disassembled

1   2   3

SA70 Electronic Assembly

1   2
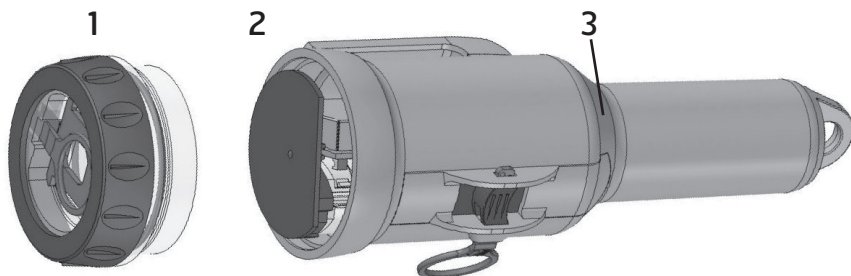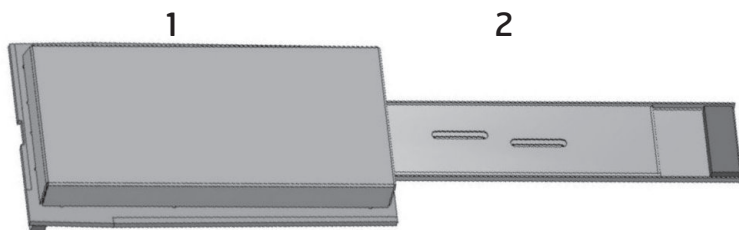
Battery Module

Bottom Lid

1

2

3

4

Wall Bracket

56,5

44

50

59,1

251

90

SA70 AIS SART main unit

The base of antenna

Clip

The state when inserted
into the wall bracket

Insert the clip of the AIS-
SART main unit into the
wall bracket from a top

Wall

Wall bracket:
- For mounting, use 3 mm
  screws or wood screws,
  depending on the wall type

Lifeboat Bracket

Figure 4.1.2a, Lifeboat bracket
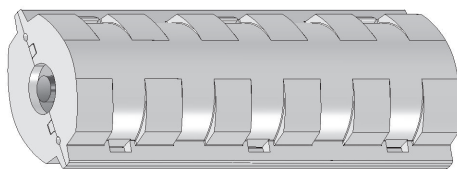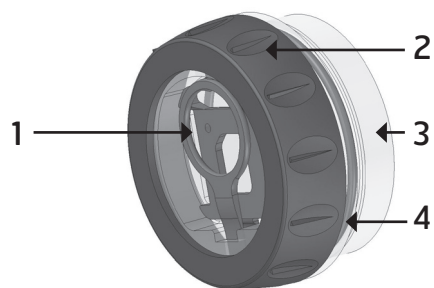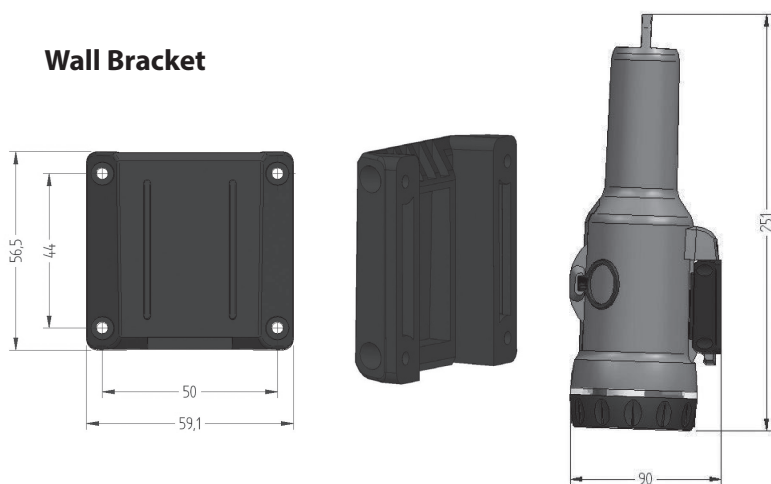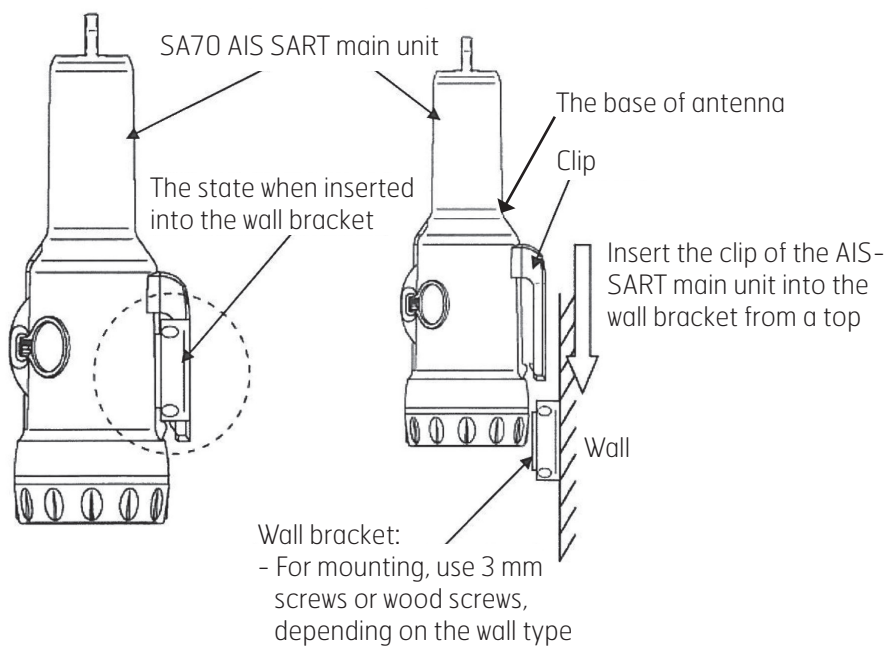
Figure 4.1.2b, SA70 to put into
lifeboat bracket
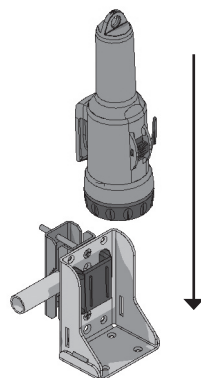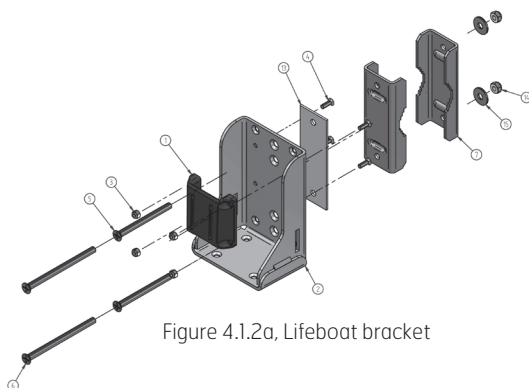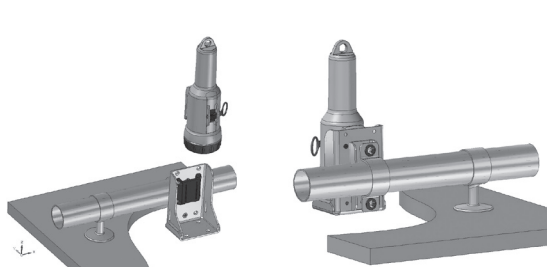
Figure 4.1.2c, Examples of pipe mounting

Figure 4.1.2e Example of Mounting the Bracket on Interior and Exterior Walls of a Lifeboat

Figure 4.1.2d, SA70 lifeboat bracket

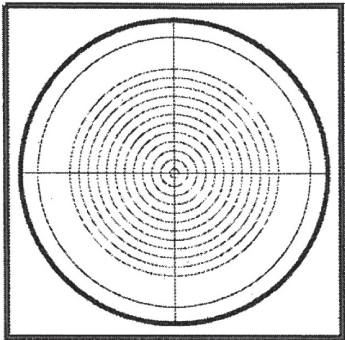## Using the telescopic pole
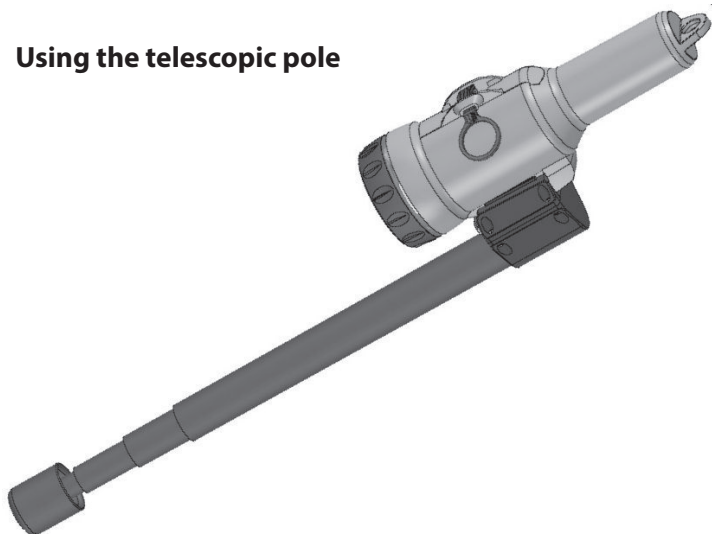
Examples of usage in life boat/liferaft
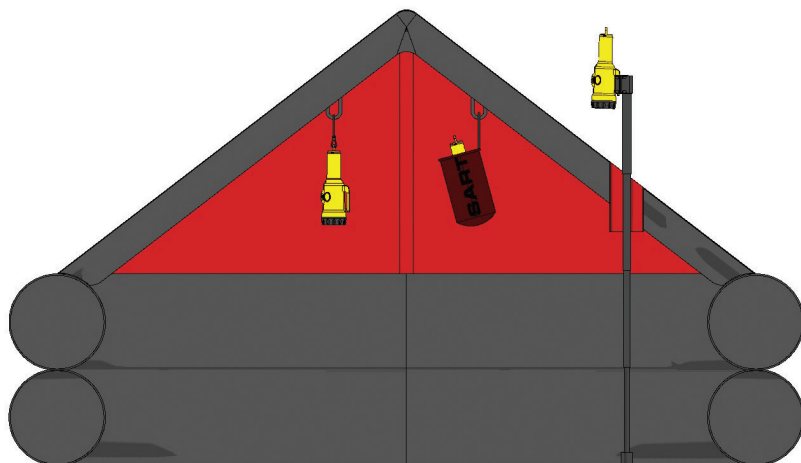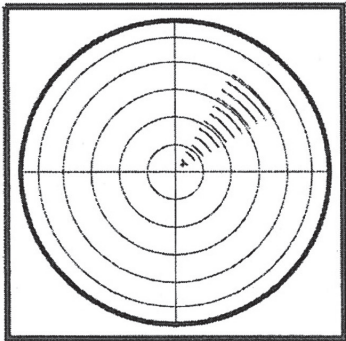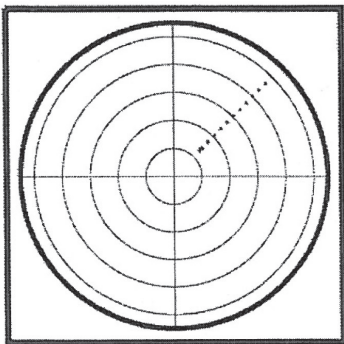

10 m reel with lanyard

Test of SA70

Typical display when SA70 is located near (<0.2 nm) the radar. Radar range is 10 nm. Rings are off.

Typical display when SA70 is located close (1nm) to the radar. Radar range is 10 nm. Rings are at 2 nm.

Typical display when SA70 is located away (>2 nm) from the radar. Radar range is 10 nm. Rings are at 2 nm.

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