

MARITIME SAFETY COMMITTEE  
109th session  
Agenda item 13

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## NAVIGATION, COMMUNICATIONS AND SEARCH AND RESCUE

### Ineffectiveness of the radar SART

Submitted by the United States

#### SUMMARY

*Executive summary:* The **SEACOR POWER** casualty in 2021 highlighted the ineffectiveness of the radar SART in locating survivors due to the requirement that the ship's navigation radar be detuned, degrading its performance, when placed in the radar SART mode. Equivalent AIS SARTs allowed under the GMDSS do not have this problem. While no clear consensus emerged from NCSR 11 on how to best resolve this problem, there was consensus that relevant information could be circulated by means of an MSC circular.

*Strategic direction, if applicable:* 2

*Output:* Not applicable

*Action to be taken:* Paragraph 7

*Related documents:* NCSR 11/19, NCSR 11/18/5; SN/Circ.197 and resolution MSC.192(79)

#### Introduction

1 When GMDSS amendments to the SOLAS Convention were adopted over nearly four decades ago, the radar search and rescue transponder (SART) was selected in meeting the distress locating function since ships already carried an effective radar SART direction finder (a 3 cm radar). The AIS search and rescue transmitter (AIS-SART) was adopted into the GMDSS as a functional equivalent to the radar SART. In 1997, *Operation of marine radar for SART detection* (SN/Circ.197) warned radar operators that "Care should be taken in operating the radar in the detuned condition (to increase the visibility of the SART) as other wanted navigational and anti-collision information may be removed".\* In the four decades since the radar SART was adopted, continuing advances in radar processing technology had further exacerbated this problem. Since SART activation is uncommon, crews of vessels and aircraft

\* While the radar performance standard resolution MSC.192(79) provides X-band radars detect radar SARTs, it does not provide SARTs and other wanted navigational and anti-collision information be displayed together. It only provides that "It should be possible to switch off those signal processing functions, including polarization modes, which might prevent an X-Band radar beacon or SARTs from being detected and displayed".

responding to a distress incident may not remember to tune their radars for optimal SART detection and may be reluctant to do so due to its degradation of the radar's normal operation. Intentionally degrading radar navigation performance to search for possible SARTs may in itself create a safety hazard.

2 The ineffectiveness of the radar SART was demonstrated during the capsizing of liftboat **SEACOR POWER** in the Gulf of Mexico, on 13 April 2021, resulting in the loss of 13 lives at sea. When the liftboat capsized, the mate had grabbed one of two radar SARTs when egressing the vessel and turned it on after being washed overboard. However, responders stated they never saw the SART's signal appear on their radars, even though the mate stated seeing the light on the device illuminate, indicating that it was being interrogated by a vessel's radar. During post-casualty testing with a response boat and fire department boat, the United States National Transportation Safety Board found that crews were initially unable to see the SART signal. The range ring on the radar display was instead set appropriately for the navigational area and was not expanded to 12 NM rings as suggested by the SART user's manual. The SART signal was detected only after the crew became familiar with procedures addressing changes to the radar gain, clutter, and range necessary to accommodate the SART, rather than retaining settings necessary to accommodate radar targets in areas being searched or navigated. The analysis did not consider the safety risks involved in asking radar operators to degrade radar navigation performance necessary to detect radar SARTs.

3 The Joint IMO/ITU Experts Group on Maritime Radiocommunication Matters, the ICAO/IMO Joint Working Group on Harmonization of Aeronautical and Maritime Search and Rescue, and the eleventh session of the NCSR Sub-Committee addressed this matter, considering possible solutions. Those possible solutions included phasing out the radar SART or amending the radar performance standards allowing SART detection without impairing radar navigation performance. These solutions would require a new output and could not be accomplished quickly. Although not a solution, the need to increase operator awareness of the problem through improved radar training or operator familiarization was also considered.

## Discussion

4 Document NCSR 11/19, paragraph 18.18 invited interested Member States to consider submitting a proposal for a new output, as appropriate, including the circulation of information by means of an MSC circular. However, as noted in document MSC 108/20, paragraph 18.3, MSC agreed to a moratorium on new output proposals through MSC 109. While no clear consensus emerged from NCSR 11 on how to best address safety risks involved in asking radar operators to degrade radar navigation performance necessary to detect and locate radar SARTs, there was consensus that the problem be urgently identified in an MSC circular. In supporting the need for a circular, a view was expressed at NCSR that "Improvements take time – Time costs lives". The United States supports that view and has therefore proposed a draft circular for the consideration of the Committee, and will look to submit a new output proposal at a later session.

5 While neither training nor familiarization will resolve the inability of IMO performance standard-compliant radars to display radar SARTs without degrading its navigation display, improving the training of radar operators to make them aware of this limitation and the safety risks involved is a prudent way forward.

6 Recognizing that solutions, even if implemented, could not be accomplished quickly, administrations and shipowners should consider local measures in addressing these radar SART detection issues. Local measures could consist of safety alerts or bulletins addressing the problem; opting to equip ships with AIS SARTs rather than radar SARTs, as permitted under SOLAS, thus avoiding the problem altogether; or locally phasing out carriage of radar SARTs.

**Action requested of the Committee**

7 The Committee is invited to:

- .1 consider the discussion in paragraph 4 and the proposed draft MSC circular set out in the annex; and
- .2 invite Member States to consider the discussion in paragraph 6,

and take action, as appropriate.

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## ANNEX

### DRAFT MSC CIRCULAR

#### GUIDANCE ON THE DIFFICULTIES AND RISKS INVOLVED IN THE SETTING OF RADAR DISPLAYS TO CORRECTLY VISUALIZE RADAR SAR TRANSPONDER (SART) SIGNALS

#### 1 Introduction and purpose

1.1 On 13 April 2021, the liftboat **SEACOR POWER** capsized in the Gulf of Mexico, resulting in the loss of 13 lives at sea. When the liftboat capsized, the mate had grabbed one of two radar SARTs when egressing the vessel and turned it on after being washed overboard. However, responders stated they never saw the SART's signal appear on their radars, even though the mate stated seeing the light on the device illuminate, indicating that it was being interrogated by a vessel's radar. During post-casualty testing with a response boat and fire department boat, the United States National Transportation Safety Board found that crews were initially unable to see the SART signal. The range ring on the radar display was instead set appropriately for the navigational area, and was not expanded to 12 NM rings as suggested by the SART user's manual. The SART signal was detected only after the crew became familiar with procedures addressing changes to the radar gain, clutter, and range necessary to accommodate the SART, rather than retaining settings necessary to accommodate radar targets in areas being searched or navigated. Follow-on testing with search and rescue aircraft was also successful only after training the air crews what to look for.<sup>1</sup> Since SART activation is uncommon, crews of vessels and aircraft responding to a distress incident may not remember to tune their radars for optimal SART detection, and may be reluctant to do so due to its degradation of the radar's normal operation.

1.2 The purpose of this guidance is to advise radar operators, those engaged in search and rescue, and shipowners of the difficulties and risks involved in the setting of radar displays to correctly visualize radar SART signals, and guidance on how best to mitigate those problems and risks.

#### 2 Radar SART mode

2.1 While the radar performance standards set out in resolution MSC.192(79) require X-band radars to detect radar SARTs, it does not require SARTs and other wanted navigational and anti-collision information to be displayed together. The performance standards only provide that "It should be possible to switch off those signal processing functions, including polarization modes, which might prevent an X-Band radar beacon or SARTs from being detected and displayed." *Operation of marine radar for SART detection* (SN/Circ.197) warns radar operators that "Care should be taken in operating the radar in the detuned condition (to increase the visibility of the SART) as other wanted navigational and anti-collision information may be removed."

2.2 The radar operator's manual should be consulted on necessary settings for displaying radar SART signals. These settings typically change range settings and detune the radar out of its best tuning condition, erasing or weakening all normal radar echoes. For this reason, radars should only be set to display radar SART signals when not immediately needed for navigation or target detection.

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<sup>1</sup> See Docket Items 82 to 88 for the Search and Rescue Transponder (SART) Specialist's Factual Report and its six annexes. <https://data.ntsb.gov/Docket/?NTSBNumber=DCA21MM024>

2.3 Operators should assess the risks of missing radar SART signals from possible survivors, or missing important radar targets, when setting the radar into the SART mode in a given situation and decide accordingly.



SEACOR's radar SART display when radar was properly set to SART mode. None of the vessels involved in the search for survivors received this radar SART signal<sup>2</sup>

### 3 AIS SARTs

3.1 SOLAS regulation IV/7 requires every ship to be provided with either a radar SART or an AIS-SART to meet the GMDSS functional requirement for transmitting and receiving signals for locating as required by regulation IV/4. AIS-SART signals are shown with other AIS targets, distinctly marked on IEC 62288-compliant shipboard navigation displays. AIS-SARTs do not experience the reception problems radar SARTs experience and require no special mode setting.

3.2 Shipowners and shipyards are encouraged to select the AIS-SART option rather than the radar SART option when outfitting ships for GMDSS. They are further encouraged to replace existing radar SARTs with AIS-SARTs by the date the radar SART battery becomes due for replacement, minimizing the cost to shipowners.<sup>3</sup>



AIS-SART symbol (Source: SN.1/Circ.243)

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<sup>2</sup> Ibid, see figure 9.

<sup>3</sup> AIS-SARTs are also typically less expensive than radar SARTs.