Input paper: [[1]](#footnote-2) ENG16-3.1.3.4.2

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Author(s) / Submitter(s) CHINA MSA

Draft Proposal on R0101 MARINE RADAR BEACONS modification

# Summary

This paper directs at IALA R0101 MARINE RADAR BEACONS Recommendation gives a proposal for racon upgrade.

## Purpose of the document

Give some suggestions on R0101 modification and racon upgrading for the committee to consider.

## Related documents

R0101 MARINE RADAR BEACONS.

R0146 STRATEGY FOR MAINTAINING RACON SERVICE CAPABILITY

ENG15-3.1.3.3 Introduction to the tests information on next generation Racon

# Background

## Possible problems raised by the application of solid-state radar

At the end of the 20th century, solid-state radar technology was introduced into maritime sector as navigation radar. Compared with traditional magnetron radar, solid-state radar has the advantages of strong anti-jamming ability, strong anti-rain and fog ability, high resolution, maintenance free and low radiation etc. As these relative technological advantages, solid-state radars have been applied on increasing numbers of vessels, and widely equipped on MASS as well.

However, because the peak power of the new solid-state radar signal is much smaller than that of traditional radar, and the new signal processing method, the new technology solid-state radar cannot trigger the current racon. With the increasing number of users of solid-state radar, if racons still cannot respond to solid-state radar, it may bring potential risks to navigation safety in the future.

## ERPS System

IALA has been making great efforts for the development of ERPS. According to several ERPS experiments’ results, the signal feedback effect of ERPS is not ideal because of the single frequency of the traditional magnetron radar. However, this problem may be solved with the widespread application of solid-state radar with much wider range of frequency band, provided that the racon is upgraded in time to meet the corresponding technical requirements of solid-state radar.

## IMO

IMO has published regulations about racon on Nov 19, 1987: IMO Resolution A.615(15).

The ANNEX 2 of Resolution A.615(15) states as follow:

***“2. Operating frequencies***

*2.1 Radar beacons designed to operate on a wavelength of 3 cm should be capable of being interrogated by any navigational radar equipment operating on any frequency between 9,320 MHz and 9,500 MHz and respond within this frequency band.”*

# Discussion

## Next generation radar beacon test

In March 2021, CHINA MSA carried out an experiment on the availability of a new type of racon (please refer to: ENG15-3.1.3.3 Introduction to the tests information on next generation Racon). The test results indicate that this new type racon can respond not only to the traditional magnetron radar, but also to the new technology solid-state radar, including FM continuous wave radar and pulse compression radar. Thereby, it has been proved that racon upgrading is technical feasible.

However, racon upgrade cannot be done only with technical solutions, it is essential to obtain support from technical standards and normative documents of relevant organizations, so as to remove obstacles for the development of technology and industry.

## Suggestions for R0101 Modification

The following changes to R0101 are proposed for IALA committee:

1. Add a line "4 Compatibility" to the fourth item (Response) in Part 1 and Table 1, which reads: "the design of a racon should be compatible with all types of conventional and NT radars.".

This sentence is actually described in part 5.4 of *IALA R0146 STRATEGY FOR MAINTAINING RACON SERVICE CAPABILITY*.

1. Add the following sentence at the end of **A 3.3. SIDELOBE SUPPRESSION** in PART 3: “Or by using radar’s sidelobe suppression function to suppress the rest - the racon replies with weak signals upon receipt of weak signals.”

In addition to identifying the strongest signal as the main lobe, there is also a "natural" processing method of side lobe suppression, that is, using the side lobe suppression function of the radar itself: the radar beacon receives weak radar signals (or reflections by vessels and other objects) and also replies with weak signals, so as to achieve side lobe suppression.

# References

1. IMO Resolution A.615(15)

# Action requested of the Committee

The Committee is invited to consider the information and take actions as appropriate.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-2)
2. Leave open if uncertain [↑](#footnote-ref-3)