

## Liaison Note to CIRM

### On the Effect of Radars on Racons in Busy Harbours

#### 1 Introduction

Over the years, there has been anecdotal evidence that racons (marine radar beacons) perform poorly in busy harbours. The effects can range from limited racon response to no response, which can change over time due to vessel movement. To quantify this problem an experiment was designed to survey radar traffic. A test racon was made available to capture the survey data. Please see the paper IALA ENAV20-13.11 on Racons in Busy Harbours, attached.

#### 2 Background on Racon Side Lobe Suppression Feature

All radar antennas are imperfect to some extent. They can radiate detectable amounts of power at other angles than the “main lobe” of the antenna. It is undesirable for a racon to respond to anything but the main lobe, because the extraneous responses can clutter the radar display and confuse an operator. Racons are designed to suppress responses to “side lobes” of antennas (SLS). SLS works by identifying a signature for each radar. Frequency and Pulse Width are typically used for identification. Racons respond only to the strongest signals from identified radars, typically within 10dB of the strongest signal. When there are two or more radars with the same signature, it is likely that only one of the radars will be responded to, and the others will not. The radar that is responded to will change as ships move about and signal strength at the racon changes.

#### 3 Study Conclusions

There were two relevant conclusions from the study. The first conclusion is that marine radar emissions seem to be concentrated around a small number of frequencies and the second conclusion is there are many radars at the same frequency. As described in the section above, many radars operating at the same frequency can cause the racon SLS feature to suppress responses to the less powerful radars. Future solid state radars could potentially operate using fewer and more precisely defined frequencies than older radars, which could exacerbate the problem.

Two techniques that would lessen the effects described would be for radar manufacturers to: a) use more of the frequencies within the band, and b) avoid repeatedly using the same frequency on a large number of units.

#### 4 Action requested

CIRM is requested to:

- note the conclusions of the study described in this note and in IALA Paper ENAV20-13.11;
- consider the fact in appropriate CIRM work groups;
- advise on how IALA and CIRM can work together to alleviate this problem.