





ASSEMBLY - 15th session  
Agenda item 12

IMO

RESOLUTION A.615(15)

adopted on 19 November 1987

RADAR BEACONS AND TRANSPONDERS

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECOGNIZING the improved navigational information which radar beacons and transponders can provide for the safety of navigation,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its fifty-fourth session,

1. ADOPTS:

- (a) the Recommendation on the Marine Uses of Radar Beacons and Transponders set out in Annex 1 to the present resolution and considers that Recommendation as the IMO policy document on the subject;
- (b) the Recommendation on Operational Standards for Radar Beacons set out in Annex 2 to the present resolution;
- (c) the Recommendation on Transponders set out in Annex 3 to the present resolution;

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2. RECOMMENDS Member Governments to ensure that:

- (a) the use of radar beacons and transponders conforms with Annex 1 to the present resolution;
- (b) radar beacons conform to operational standards not inferior to those contained in Annex 2 to the present resolution;
- (c) transponders conform to the recommendations contained in Annex 3 to the present resolution;

3. REVOKES resolution A.423(XI).

ANNEX 1

RECOMMENDATION ON THE MARINE USES OF  
RADAR BEACONS AND TRANSPONDERS

1 Introduction

1.1 The uncontrolled provision of radar beacons and transponders could cause degradation of ships' navigational radar and ARPA\* displays, produce incompatibilities among devices developed for different uses, or necessitate a succession of modifications to ships' radar displays to accommodate progressive developments of radar beacons and transponders.

1.2 To avoid these possibilities, the following recommendations are made concerning the appropriate applications for radar beacons and transponders, where an operational requirement for such a device exists, and concerning measures for general administration of radar beacons and transponders.

1.3 The technical criteria and operation of radar beacons and transponders are similar. However, the terms "radar beacon" (racon) and "transponder", as used in this recommendation, are understood to have the following meanings:

- .1 Radar beacon (racon): A receiver-transmitter device associated with a navigational mark which, when triggered by a radar, automatically returns a distinctive signal which can appear on the display of the triggering radar, providing range, bearing and identification information. The terms "radar beacon" and "racon" should be reserved exclusively for this use and include devices mounted on fixed structures, or on floating aids anchored at fixed positions, for navigational purposes. The racon itself is considered a separate aid to navigation, whether used alone, or mounted on another aid to navigation (such as a visible mark).

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\* In this recommendation "radar display" includes ARPA display.

- .2 Transponder: A receiver-transmitter device in the maritime radio determination service which transmits automatically when interrogated, or when a transmission is initiated by a local command. The transmission may include a coded identification signal and/or data. The response may be displayed on a radar PPI, or on a display separate from any radar, or both, depending upon the application and content of the signal.

## 2 General operational characteristics

### 2.1 Radar beacons

2.1.1 A radar beacon in the maritime radionavigation service\* is a device which will:

- .1 be triggered automatically by the transmissions of any radar operating in the appropriate frequency band; and
- .2 transmit a response immediately on receipt of the triggering pulse for display as part of the normal picture of the triggering radar.

2.1.2 Where a radar beacon incorporates a user-selectable mode, so that a user can control the presentation of a radar beacon response, it will also:

- .1 be triggered automatically by the transmission of a suitably configured radar in the vicinity operating in the appropriate frequency band and using its own user-selectable facility; and
- .2 transmit a response so that it can:
  - .2.1 be shown on the radar display in a manner distinct from that used for radar information,
  - .2.2 be shown on the radar display or other display without other information, or
  - .2.3 not be shown on the radar display.

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\* In accordance with the Radio Regulations, maritime radionavigation service means radionavigation service intended for the benefit, and for the safe operation, of ships.

2.1.3 In special circumstances, a radar beacon not being used for general navigational purposes may operate exclusively in the user-selectable mode.

## 2.2 Transponders

A transponder is a device which can provide for:

- .1 ship radar target identification and echo enhancement with the proviso that such enhancement should not significantly exceed that which could be achieved by passive means on the radar display of an interrogating ship or shore station;
- .2 radar target correlation with voice or other radio transmission for identification on the radar display of an interrogating ship or shore station;
- .3 user-selectable presentation of transponder responses either superimposed on the normal radar display, or free of clutter and other targets; and
- .4 transfer of information pertinent to avoidance of collision or other hazards, manoeuvre, manoeuvring characteristics, etc.

## 3 Operational use

3.1 Radar beacons should be used only for radionavigational purposes\*, for example:

- .1 ranging on and identification of positions on inconspicuous coastlines;
- .2 identification of positions on coastlines which permit good ranging but are featureless;
- .3 identification of selected navigational marks both seaborne and land-based;
- .4 landfall identification;

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\* Radar beacons should not be used to enhance the detection of marine craft.

- .5 as a warning device to identify temporary navigational hazards and to mark new and uncharted dangers;
- .6 bridge marking;
- .7 leading lines;
- .8 identification of offshore structures;
- .9 marking important features in channels.

3.2 Radar beacons used at locations where clutter from land, sea, ice or weather could mask their response may, at the discretion of the Administration concerned, incorporate a user-selectable mode\*.

3.3 Where an operational requirement exists for a responding device, other than for radionavigational purposes, a transponder should be used. Examples of requirements suitable for transponders are:

- .1 identification of certain classes of ships (ship-to-ship) and towed devices;
- .2 identification of ships for VTS and other shore surveillance purposes;
- .3 search and rescue operations;
- .4 identification of individual ships and data transfer;
- .5 establishing positions for hydrographical purposes.

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\* It is noted that to ensure compatibility of the user-selectable mode of radar beacons with marine radars, international operating and technical specification are being studied by CCIR. On completion of the work of CCIR, consideration should be given to the need to include optional standards for a user-selectable mode in appropriate shipborne equipment.

4 General administration of radar beacons and transponders

4.1 All radar beacons should be authorized by an Administration or by a competent navigation authority. Before authorizing or approving the setting up of a radar beacon, account should be taken of the density of such devices in the particular area and the need to prevent degradation of ships' radar displays.

4.2 Except in the case of SAR transponders (see resolution A.530(13)), transponder systems designed to respond in a frequency band used by marine radars should be authorized by an Administration. Before giving such authorization, account should be taken of the effect such transmissions would have on ships' radars.

ANNEX 2

RECOMMENDATION ON OPERATIONAL STANDARDS FOR RADAR BEACONS

1 Introduction

1.1 Radar beacons should conform to the following minimum operational standards.

1.2 Radar beacons should be operationally compatible with navigational radar and ARPA equipment which conforms to the performance standards recommended by the Organization.

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.

2.2 Radar beacons designed to operate on a wavelength of 10 cm should be capable of being interrogated by any navigational radar equipment operating on any frequency between 2,900 MHz and 3,100 MHz and respond within this frequency band.

3 Transmitter tuning characteristics

The tuning characteristics of the transmitter should be such that the beacon response can appear on a radar display\* in a recognizable form at least once every 2 mins.

4 Operating range

The operating range should be compatible with the navigational requirements for the radar beacon at its location.

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\* In this recommendation "radar display" includes ARPA display.

## 5 Response characteristics

5.1 On receipt of an interrogating signal, the radar beacon should commence its response in such time that the gap on the radar display between the radar target and the beacon response does not normally exceed approximately 100 m. In certain cases, the operational use of radar beacons may be aided by increasing this delay slightly. Under such circumstances, the delay time should be as short as practicable and the details should be shown in appropriate navigational publications.

5.2 The duration of the response should be approximately 20% of the maximum range requirement of the particular radar beacon, or should not exceed 5 miles, whichever is the lower value. In certain cases, the duration of the response may be adjusted to suit the operational requirements for the particular radar beacon.

5.3 The leading edge of the response should be sufficiently sharp to permit satisfactory range determination.

## 6 Identification coding

6.1 Identification coding should normally be in the form of a Morse letter. The identification coding used should be described in appropriate navigational publications.

6.2 The identification coding should comprise the full length of the radar beacon response and, where a Morse letter is used, the response should be divided with a ratio of 1 dash equal to 3 dots and 1 dot equal to 1 space.

6.3 The coding should normally commence with a dash.

## 7 User-selectable mode

7.1 Radar beacons may be provided with a user-selectable mode. In this mode the radar beacon, in addition to satisfying the response characteristics set out in section 5, should be capable of transmitting a response after receipt of an interrogating signal from a suitably configured radar using its own user-selectable facility.

7.2 The characteristics of the interrogating signal and the response should conform to the appropriate CCIR Recommendations.

7.3 Radar beacons provided with a user-selectable mode should, unless operating exceptionally only in the user-selectable mode, be capable of responding to interrogations from both normal radar signals and special interrogating signals with a minimum of interruption in response to any user.

## 8 Construction

Radar beacons should be designed to provide high availability when installed permanently in a marine environment.

ANNEX 3

RECOMMENDATION ON TRANSPONDERS

1 The design of transponder systems should ensure that there is no significant degradation in the use of radar beacons, and the response of a transponder should not be capable of being interpreted as being from a radar beacon of any type.

2 Where a transponder is to be used with a marine navigational radar or ARPA, any modifications necessary to the radar or ARPA should not degrade its performance; they should be kept to a minimum, be simple and be compatible with a user-selectable beacon facility.

3 Transponders should not be used to enhance the detection of marine craft, except for search and rescue or when specially authorized by Administrations for safety\* purposes. Transponders used for search and rescue purposes should be capable of transmitting signals which will appear on a radar or ARPA display as a series of equally spaced dots (resolution A.530(XIII)).

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\* This application of transponders should be strictly limited in accordance with guidelines prepared by the Administration concerned. For all cases a local notice to mariners should be issued before such transponders are used.

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