

**RESOLUTION A.665(16)**

*Adopted on 19 October 1989  
Agenda item 10*

**PERFORMANCE STANDARDS FOR RADIO  
DIRECTION-FINDING SYSTEMS**

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,

BEARING IN MIND that regulations V/12(p) and (r) of the International Convention for the Safety of Life at Sea, 1974, as amended in 1988, require that ships of 1,600 tons gross tonnage and upwards shall be fitted with radio direction-finding apparatus and that such apparatus shall conform to appropriate performance standards not inferior to those adopted by the Organization,

NOTING that the technical requirements of regulation IV/11 of the 1974 SOLAS Convention, in force prior to entry into force of the 1988 amendments, are no longer included in the Convention but continue to apply to equipment installed on ships,

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

1. ADOPTS the Performance Standards for Radio Direction-Finding Systems, the text of which is set out in the Annex to the present resolution;
2. RECOMMENDS Member Governments to ensure that radio direction-finding apparatus fitted in compliance with regulation V/12(p) of the 1974 SOLAS Convention conforms to performance standards not inferior to those specified in the Annex to the present resolution.

ANNEX

**PERFORMANCE STANDARDS FOR RADIO  
DIRECTION-FINDING SYSTEMS**

1 INTRODUCTION

1.1 The direction-finding equipment should be capable of indicating both the bearing and sense of radio transmissions in the frequency bands specified in paragraph 2.

1.2 In addition to meeting the general provisions contained in resolution A.574(14), the direction-finding equipment should comply with the following minimum performance requirements.

## 2 FREQUENCY RANGES AND CLASSES OF EMISSION

The equipment should be capable of receiving signals of classes of emission A1A, A2A and H2A in the frequency range 255 kHz to 525 kHz and A1A, A2A, H2A, A3E and H3E in the frequency range 2,167 kHz to 2,197 kHz.

## 3 SELECTIVITY

The selectivity should be such as to allow a bearing to be taken readily without interference from other radio transmissions on frequencies more than 2 kHz from the desired signal.

## 4 SIGNAL IDENTIFICATION

4.1 Means of audio-monitoring should be provided regardless of the method used for direction-finding.

4.2 The equipment should be suitable for use with headphones. If a loudspeaker is provided, it should be capable of being rendered inoperative by simple means.

## 5 BEARING INDICATION

Means should be provided to indicate the bearing of the desired transmission. Such indication should be capable of being easily, rapidly and precisely resolved within 0.25°.

## 6 BEARING ACCURACY

6.1 The instrumental accuracy in taking relative bearings should be within  $\pm 1^\circ$ . This requirement should be met at all frequencies in the frequency bands specified in paragraph 2 of this recommendation and throughout the whole 360° of azimuth at field strength values between 50  $\mu\text{V}/\text{m}$  and 50  $\text{mV}/\text{m}$ .

**Note:** The instrumental accuracy referred to above does not apply to the operational accuracy attainable in service, which should be determined for each installation taking into account paragraphs 10.3, 10.4 and 10.5 of this recommendation. In particular, the operational accuracies in the 2 MHz band should be sufficient for homing purposes.

6.2 Pre-set facilities to correct the quadrantal error should normally be provided for the frequency band 255 kHz to 525 kHz.

## 7 MANUAL CONTROLS AND THEIR OPERATION

A tuning scale or indicator should be provided, calibrated to indicate directly the carrier frequency of the signal to which the equipment is intended to be tuned.

- .1 If a tuning scale is provided, 1 mm should correspond, at all points in its range, to not more than 2.5 kHz in the frequency range 255 kHz to 525 kHz.
- .2 The maritime distress frequencies should be marked prominently.
- .3 Where other means of frequency indication are provided, the resolution should be at least 1 kHz.

## 8 OPERATIONAL AVAILABILITY

The equipment should be ready for operation within 60 s of switching on.

## 9 SPECIAL REQUIREMENTS FOR DIFFERENT METHODS OF DIRECTION-FINDING

### 9.1 Aural minimum method

- .1 With a field strength sufficient to ensure a signal/noise ratio of at least 50 dB, a change in the setting of the bearing indicator of 5° in either direction from the position of minimum output should cause the audio frequency output to increase by not less than 18 dB. Similarly, a change of 90° in either direction should cause an increase of not less than 35 dB.
- .2 The equipment should be provided with a minimum-clearing control giving a noticeable minimum of the output at all settings.
- .3 The sense should be determined by reference to the lower output.
- .4 The sense ratio in the frequency ranges 255 kHz to 525 kHz and 2,167 kHz to 2,197 kHz should be 15 dB and 10 dB, respectively.
- .5 The automatic gain control, if provided, should be rendered inoperative automatically when the equipment is used for bearing determination.

### 9.2 Other methods

- .1 There should be means of indicating that the receiver gain and signal strength are sufficient to enable a correct bearing to be taken.
- .2 With a field strength of 1 mV/m the indicated bearing should not change by more than 1° when the receiver is detuned to a point where the indication referred to in subparagraph 9.2.1 above shows that the signal strength is just sufficient to take a bearing.
- .3 For any signal strength sufficient to give a bearing indication, there should be no observable change of indicated bearing when the beat frequency oscillator is switched on.
- .4 Fluctuations of the indicated bearing caused by any servo-mechanism should not exceed  $\pm 0.5^\circ$  from the mean value.
- .5 If, after identifying a station the bearing of which is required, it is necessary to check or alter the adjustment of any control as part of the process of direction-finding, this check and adjustment should be capable of being made within 10 s.

## 10 MISCELLANEOUS AND INSTALLATION RECOMMENDATIONS

10.1 The equipment should be protected from excessive voltages induced in the antennas.

10.2 An efficient two-way means of calling and voice communication should be provided between the direction-finder and the navigating bridge.

10.3 As far as is practicable, the direction-finder should be so located that as little interference as possible from mechanical or other noise will be caused to the efficient determination of bearings.

10.4 As far as is practicable, the direction-finding antenna system should be erected in such a manner that the efficient determination of bearings will be hindered as little as possible by the close proximity of other antennas, derricks, wire halyards or other large metal objects.

10.5 All direction-finders should be calibrated to the satisfaction of the Administration on first installation. The calibration should be verified by check bearings or by a further calibration whenever any changes are made in the position of any antennas or of any structures on deck which might affect appreciably the accuracy of the direction-finder. The calibration particulars should be checked at yearly intervals, or as near thereto as possible. A record should be kept of the calibrations and of any checks made of their accuracy.

10.6 When installing and testing direction-finding equipment, due regard should be given to the relevant recommendations of ITU's International Radio Consultative Committee (CCIR).