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Agenda item 8

PERFORMANCE STANDARDS FOR NAVIGATIONAL  
RADAR EQUIPMENT

RESOLUTION A.222(VII)  
adopted on 12 October 1971

THE ASSEMBLY,

NOTING Article 16(i) of the Convention on the  
Inter-Governmental Maritime Consultative Organization concerning  
the functions of the Assembly,

BEARING IN MIND Recommendation 45 of the International  
Conference on Safety of Life at Sea, 1960, relating to radar,

HAVING CONSIDERED the Report of the Maritime Safety  
Committee on its twenty-third session,

ENDORSES the Committee's Recommendation, appearing at  
Annex, on performance standards for shipborne navigational  
radar equipment which will be required in accordance with new  
Regulation 12 of Chapter V of the International Convention  
for the Safety of Life at Sea, 1960,

RECOMMENDS Contracting Governments to the said Convention  
to ensure that the type of radar approved in accordance with  
the provisions of Regulation 12, Chapter V, of the Convention  
conforms to operational standards not inferior to those shown  
at Annex to this Resolution.

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ANNEX

RECOMMENDATION ON NAVIGATIONAL  
RADAR EQUIPMENT

1. The radar equipment required by Regulation 12 of Chapter V should provide an indication in relation to the ship of the position of other surface craft and obstructions and of buoys, shorelines and navigational marks in a manner which will assist in avoiding collision and in navigation.
2. It should comply with the following minimum requirements:

(a) Range performance

The operational requirement under normal propagation conditions, when the radar aerial is mounted at a height of 15 metres above sea level is that the equipment should give a clear indication of:

(i) Coastlines

At 20 nautical miles when the ground rises to 60 metres.

At 7 nautical miles when the ground rises to 6 metres.

(ii) Surface Objects

At 7 nautical miles a ship of 5,000 tons gross tonnage, whatever her aspect.

At 3 nautical miles a small vessel of length 10 metres.

At 2 nautical miles an object such as a navigational buoy having an effective echoing area of approximately 10 square metres.

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(b) Minimum range

The surface objects specified in paragraph (a)(ii) of this Recommendation should be clearly displayed from a minimum range of 50 metres up to a range of one nautical mile, without adjustment of controls other than the range selector.

(c) Display

- (i) The equipment should provide a relative plan display of not less than 180 mm effective diameter.
- (ii) The equipment should be provided with at least five ranges, the smallest of which is not more than one nautical mile and the greatest of which is not less than 24 nautical miles. The scales should be preferably of 1:2 ratio. Additional ranges may be provided.
- (iii) Positive indication should be given of the range of view displayed and the interval between range rings.

(d) Range measurement

- (i) The primary means provided for range measurement should be fixed electronic range rings. There should be at least four range rings displayed on each of the ranges mentioned in paragraph 2(c)(ii), except that on ranges below one nautical mile range rings should be displayed at intervals of  $\frac{1}{4}$  nautical mile.
- (ii) Fixed range rings should enable the range of an object, whose echo lies on a range ring, to be measured with an error not exceeding 1.5 per cent of the maximum range of the scale in use, or 70 metres, whichever is the greater.



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- (iii) Any additional means of measuring range should have an error not exceeding 2.5 per cent of the maximum range of the displayed scale in use, or 120 metres, whichever is the greater.

(e) Heading indicator

- (i) The heading of the ship should be indicated by a line on the display with a maximum error not greater than  $\pm 1^{\circ}$ .  
The thickness of the displayed heading line should not be greater than  $\frac{1}{2}^{\circ}$ .
- (ii) Provision should be made to switch off the heading indicator by a device which cannot be left in the "heading marker off" position.

(f) Bearing measurement

- (i) Provision should be made to obtain quickly the bearing of any object whose echo appears on the display.
- (ii) The means provided for obtaining bearings should enable the bearing of a target whose echo appears at the edge of the display to be measured with an accuracy of  $\pm 1^{\circ}$  or better.

(g) Discrimination

- (i) The equipment should display as separate indications, on the shortest range scale provided, two objects on the same azimuth separated by not more than 50 metres in range.
- (ii) The equipment should display as separate indications two objects at the same range separated by not more than  $2.5^{\circ}$  in azimuth.

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(iii) The equipment should be designed to avoid, as far as is practicable, the display of spurious echoes.

(h) Roll

The performance of the equipment should be such that when the ship is rolling  $\pm 10^\circ$  the echoes of targets remain visible on the display.

(i) Scan

The scan should be continuous and automatic through 360 degrees of azimuth.

The target data rate should be at least 12 per minute.

The equipment should operate satisfactorily in relative wind speeds of up to 100 knots.

(j) Azimuth Stabilization

(i) Means should be provided to enable the display to be stabilized in azimuth by a transmitting compass.

The accuracy of alignment with the compass transmission should be within  $\frac{1}{2}^\circ$  with a compass rotation rate of 2 r.p.m.

(ii) The equipment should operate satisfactorily for relative bearings when the compass control is inoperative or not fitted.

(k) Performance Check

Means should be available, while the equipment is used operationally, to determine readily a significant drop in performance relative to a calibration standard established at the time of installation.

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(1) Anti-clutter devices

Means should be provided to minimize the display of unwanted responses from precipitation and the sea.

(m) Operation

- (i) The equipment should be capable of being switched on and operated from the main display position.
- (ii) Operational controls should be accessible and easy to identify and use.
- (iii) After switching on from cold, the equipment should become fully operational within 4 minutes.
- (iv) A standby condition should be provided from which the equipment can be brought to a fully operational condition within one minute.
- (v) The equipment should continue to operate in accordance with the requirements of this recommendation in the presence of variations of the power supply normally to be expected in a vessel.

(n) Interference

- (i) All steps should be taken to eliminate as far as practicable the causes of, and to suppress, radio interference between the radar equipment and other equipment on board.
- (ii) Mechanical noise from all units should be so limited as not to prejudice the hearing of sounds on which the safety of the ship might depend.



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- (iii) Each unit of the equipment normally installed in the vicinity of a standard or a steering magnetic compass should be clearly marked with the minimum distances at which it may be mounted.
- (iv) After installation and adjustment on board, the bearing accuracy as prescribed in this recommendation should be maintained without further adjustment irrespective of the variation of external magnetic fields.

(o) Sea or ground stabilization

Sea or ground stabilization, if provided, should not degrade the accuracy of the display below the requirements of this recommendation, and the view ahead on the display should not be unduly restricted by the use of this facility.

(p) Durability and resistance to effects of climate

The radar equipment should be capable of continued operation under the conditions of vibration, humidity and change of temperature likely to be experienced in the vessel in which it is installed.

3. The aerial system should be installed in such a manner that the efficiency of the display is not impaired by the close proximity of the aerial to other objects. In particular, blind sectors in the forward direction should be avoided.

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