

ANNEX 11

RESOLUTION MSC.53(66)

(adopted on 30 May 1996)

**PERFORMANCE STANDARDS FOR SHIPBORNE
GLONASS RECEIVER EQUIPMENT**

THE MARITIME SAFETY COMMITTEE,

RECALLING resolution A.825(19) by which the Assembly resolved that the functions of adopting performance standards for radio and navigational equipment, as well as amendments thereto, shall be performed by the Maritime Safety Committee on behalf of the Organization,

NOTING resolution A.815(19) by which the Assembly adopted the IMO policy for the recognition and acceptance of suitable radionavigation systems intended for international use to provide ships with navigational position-fixing throughout their voyages,

HAVING IDENTIFIED that the Global Navigation Satellite System (GLONASS) may be a component of the world-wide radionavigation system,

NOTING ALSO that shipborne receiving equipment for the world-wide radio navigation system should be designed to satisfy the detailed requirements of the particular system concerned,

1. ADOPTS the Recommendation on Performance Standards for Shipborne GLONASS Receiver Equipment set out in the Annex to the present resolution;
2. INVITES Governments to ensure that GLONASS receiver equipment carried on ships of their flags conforms to performance standards not inferior to those set out in the Annex to the present resolution.

RECOMMENDATION ON PERFORMANCE STANDARDS FOR SHIPBORNE GLONASS RECEIVER EQUIPMENT

1 INTRODUCTION

1.1 The Global Navigation Satellite System (GLONASS) is a space-based positioning, velocity, and time system that has three major segments: Space, Control and User. The GLONASS Space Segment, will normally be composed of 24 satellites placed in three orbital planes with eight satellites in each plane. The satellites operate in circular 19100 km orbits at an inclination angle of 64.8° and with an 11 h and 15 min period. The spacing of satellites in orbit will be arranged so that a minimum of four satellites will be in view to users world-wide, with a position dilution of precision (PDOP) of ≤ 6 . Satellites of the system transmit signals on "L" band frequencies. Each satellite has separate lettered frequencies L1 (1602, 5625-1615.5 MHz).

1.2 Each L1 frequency carries a code standard accuracy (C), which is used in shipborne GLONASS receiver equipment. A navigation data message is super-imposed on this code.

1.3 Receiver equipment for the GLONASS intended for navigational purposes on ships with maximum speeds not exceeding 50 knots should, in addition to the general requirements contained in resolution A.694(17), comply with the following minimum performance requirements.

1.4 These standards cover the basic requirements of position-fixing for navigation purposes only and does not cover other computational facilities which may be in the equipment.

2 GLONASS RECEIVER EQUIPMENT

2.1 The words "GLONASS receiver equipment" as used in these performance standards include all the components and units necessary for the system to properly perform its intended functions. The equipment should include the following minimum facilities:

- .1 antenna capable of receiving GLONASS signals;
- .2 GLONASS receiver and processor;
- .3 means of accessing the computed latitude/longitude position;
- .4 data control and interface; and
- .5 position display and, if required, other forms of output.

2.2 The antenna design should be suitable for fitting at a position on the ship which ensures a clear view of the satellite constellation.

3 PERFORMANCE STANDARDS FOR GLONASS RECEIVER EQUIPMENT

The GLONASS receiver equipment should:

- .1 be capable of receiving and processing the Standard Positioning Service (SPS) signals of the GLONASS system and provide position information in latitude and longitude SGS-90 co-ordinates in degrees, minutes and thousandths of minutes and time of solution referenced to UTC (SU). Means should be provided to transform the computed position based upon SGS-90 into WGS 84 or into data compatible with the datum of the navigational chart in use. Where this facility exists, the display should indicate that the co-ordinate conversion is being

performed and should identify the co-ordinate system in which the position is expressed;

- .2 operate on the Standard Positioning Service (on lettered L1 frequencies and C code);
- .3 be provided with at least one output from which position information can be supplied to other equipment. The output of position information based upon SGS-90 or WGS 84, should be in accordance with IEC Publication 1162;
- .4 have static accuracy such that the position of the antenna is determined to within 100 m (95%) with horizontal dilution of position (HDOP) ≤ 4 (PDOP ≤ 6);
- .5 have dynamic accuracy such that the position of the antenna is determined to within 100 m (95%) with horizontal dilution of position (HDOP) ≤ 4 (PDOP ≤ 6) under the conditions of sea states and ship's motion likely to be experienced in ships;*
- .6 be capable of selecting automatically the appropriate satellite transmitted signals for determination of the ship's position with the required accuracy and update rate;
- .7 be capable of acquiring satellite signals with input signals having carrier levels in the range of - 130 dBm to - 120 dBm. Once the satellite signals have been acquired the equipment should continue to operate satisfactorily with satellite signal having carrier levels down to - 133 dBm;
- .8 be capable of acquiring position to the required accuracy, within 30 min, when there is no valid almanac data;
- .9 be capable of acquiring position to the required accuracy, within 5 min, when there is valid almanac data;
- .10 be capable of re-acquiring position to the required accuracy, within 5 min when the GLONASS signals are interrupted for a period of at least 24 h, but there is no loss of power;
- .11 be capable of re-acquiring position to the required accuracy, within 2 min, when subjected to a power interruption of 60 s;

* Resolution A.694(17), Publications IEC 721-3-6, IEC 945 and IEC 1108-2.

- .12 generate and output a new position solution at least once every 2 s;
- .13 the minimum resolution of position, i.e. latitude and longitude should be 0.001 min; and
- .14 have the facilities to receive and process differential GLONASS (DGLONASS) data fed to it in accordance with the standards of Recommendation ITU-R M.823. When a GLONASS receiver is equipped with a differential receiver, performance standards for static and dynamic accuracies (.4 and .5 above) should be 10 m (95%).*

4 PROTECTION

Precautions should be taken to ensure that no permanent damage can result from an accidental short circuit or grounding of the antenna or any of its input or output connections or any of the GLONASS receiver equipment inputs or outputs for a duration of 5 min.

5 FAILURE WARNINGS AND STATUS INDICATIONS

5.1 The equipment should provide an indication if the position calculated is likely to be outside of the requirements of these performance standards.

5.2 The GLONASS receiver equipment should provide as a minimum:

- .1 an indication within 5 s if either:
 - .1.1 the specified HDOP has been exceeded; or
 - .1.2 a new position has not been calculated for more than 2 s.

Under such conditions the last known position and the time of the last valid fix, with explicit indication of this state, so that no ambiguity can exist, should be output until normal operation is resumed;

- .2 a warning of loss of position; and
- .3 differential GLONASS status indication of:
 - .3.1 the receipt of DGLONASS signals; and
 - .3.2 whether DGLONASS corrections are being applied to the indicated ship's position.

* Refer to resolution A.815(19) on the World-wide Radionavigation System, adopted by the Organization.
