

Resolution A.704(17)
Adopted on 6 November 1991
(Agenda item 10)

**PROVISION OF RADIO SERVICES FOR THE GLOBAL
MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)**

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,

RECALLING ALSO that regulation IV/5 of the International Convention for the Safety of Life at Sea, 1974 (SOLAS), as amended in 1988, requires each Contracting Government to undertake to make available, either individually or in co-operation with other Contracting Governments, as they may deem practical and necessary, appropriate shore-based facilities for terrestrial and space radio services having due regard to the recommendations of the Organization,

RECALLING FURTHER that the INMARSAT system provides for radiocommunication services, including those for distress and safety, utilizing geostationary satellites in the 1.5 and 1.6 GHz band,

NOTING that the COSPAS-SARSAT system provides for the reception of distress alerts on the frequency 406 MHz utilizing polar orbiting satellites,

NOTING ALSO that regulation IV/5 of the 1974 SOLAS Convention requires the following radio services to be provided:

- a radiocommunication service utilizing geostationary satellites in the maritime mobile satellite service,
- a radiocommunication service utilizing polar orbiting satellites in the mobile satellite service,
- the maritime mobile service in the bands between 156 MHz and 174 MHz,
- the maritime mobile service in the bands between 4,000 kHz and 27,500 kHz, and
- the maritime mobile service in the bands 415 kHz to 535 kHz and 1,605 kHz to 4,000 kHz,

NOTING FURTHER that regulation 5.1.1 of the International Convention on Maritime Search and Rescue, 1979, requires that Parties shall ensure that such continuous radio watches as are deemed practicable and necessary are maintained on international distress frequencies,

TAKING INTO ACCOUNT the resolutions of the World Administrative Radio Conference for Mobile Services, 1987, in particular:

- resolution 331(Mob-87), Relating to the introduction of provisions for the global maritime distress and safety system (GMDSS) and the continuation of the existing distress and safety provisions, and
- resolution 322(Rev.Mob-87), Relating to coast stations and coast earth stations assuming watchkeeping responsibilities on certain frequencies in connection with the implementation of distress and safety communications for the global maritime distress and safety system (GMDSS),

TAKING INTO ACCOUNT ALSO resolution 3, "Recommendation on the early introduction of the global maritime distress and safety system (GMDSS) elements", adopted by the 1988 GMDSS Conference,

CONSIDERING that the GMDSS will use digital selective calling equipment operating in the MF, HF and VHF bands,

CONSIDERING ALSO that ships should not be required to install equipment intended primarily for ship/shore communication functions when operating in areas where no corresponding shore-based facilities are available,

CONSIDERING FURTHER that it is necessary to provide radio services for transmission and reception of distress and safety communications and that not all coast stations will be obliged to provide for such distress and safety communications,

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

1. ADOPTS the Recommendation on Provision of Radio Services for the GMDSS, the Criteria for Use when Providing Shore-Based Digital Selective Calling (DSC) Facilities for Use in the GMDSS, the Criteria for Establishing GMDSS Sea Areas and the Criteria for Use when Providing a NAVTEX and/or International SafetyNET Services set out respectively in annexes 1, 2, 3 and 4, to the present resolution;
2. RECOMMENDS that Governments undertake, as a matter of urgency, a review of the need to provide shore-based facilities to support the GMDSS and to make available, either individually or in co-operation with other Governments, adequate shore-based facilities for terrestrial and space radio services deemed practicable and necessary;
3. URGES Governments to provide, either individually or in co-operation with other Governments, the radio services deemed practicable and necessary for the proper operation of the GMDSS;
4. INVITES Governments and organizations concerned to inform the Secretary-General of radio facilities to be provided in support of the GMDSS in response to this resolution;
5. REVOKES resolution A.659(16).

Annex 1

RECOMMENDATION ON PROVISION OF RADIO SERVICES FOR THE GMDSS

1 Governments should establish such coast stations, individually or in co-operation with other Governments, as are needed to designate a sea area or areas A1 or A2, or both, off their coasts. Each sea area should be established in accordance with the criteria for establishing GMDSS areas recommended in annex 3.

2 Areas not defined by Governments as sea areas A1 or A2 will, as appropriate, be designated as sea areas A3 or A4 in accordance with regulations IV/2.14 and IV/2.15 of the 1974 SOLAS Convention, as amended in 1988.

3 Each Government should submit to the Organization information on the sea area or sea areas A1, A2 and A3, NAVTEX and/or international SafetyNET service areas it has established for the GMDSS and on any changes which may affect the sea area or areas it has so defined.

- 4 Governments, taking into account annex 2, should, as appropriate, make provision for radio-communications in each sea area A1 or A2 they have defined and, in addition, Governments are invited to provide for radiocommunications in sea areas A3 or A4, as appropriate, for the purposes of:
- .1 reception of ship-to-shore distress alerting; in particular, facilities for receiving distress alerts on the frequency 406 MHz are urgently needed in the southern hemisphere;
 - .2 transmission of shore-to-ship distress alerting;
 - .3 transmission and reception of search and rescue co-ordinating communications;
 - .4 transmission and reception of navigational and meteorological warnings and urgent information; and
 - .5 transmission and reception of general radiocommunications.

Annex 2

CRITERIA FOR USE WHEN PROVIDING SHORE-BASED DIGITAL SELECTIVE CALLING (DSC) FACILITIES FOR USE IN THE GMDSS

- 1 Governments desiring to provide an HF coast station facility for use in the GMDSS should notify the Organization of their intention so that the Organization can maintain and circulate a complete list of stations providing HF DSC distress watch. Governments should ensure that such shore-based HF DSC facilities are provided in accordance with the criteria contained in appendix 1.
- 2 Governments, individually or in co-operation with other Governments within a specific SAR region, desiring to provide MF coast station DSC facilities serving, either wholly or in part, a particular sea area A2, should notify the Organization as to the extent of continuous coverage and the extent of coverage from shore. This information should be determined by Governments in accordance with the Criteria for Establishing GMDSS Sea Areas contained in annex 3. Governments should ensure that shore-based MF coast station DSC facilities providing part of this sea area A2 coverage, are provided in accordance with appendix 2.
- 3 Governments, individually or in co-operation with other Governments within a specific SAR region, desiring to provide VHF coast station DSC facilities serving, either wholly or in part, a particular sea area A1, should notify the Organization as to the extent of continuous coverage and the extent of coverage from shore. This information should be determined by Governments in accordance with the criteria contained in annex 3. Governments should ensure that shore-based VHF coast station DSC facilities providing part of this sea area A1 coverage, are provided in accordance with appendix 3.
- 4 The Organization should maintain a master plan of all sea areas covered by MF and VHF coast station DSC facilities and should periodically circulate an updated copy of the description of such sea areas to Governments.

Appendix 1 to annex 2

1 BASIC PRINCIPLES FOR ESTABLISHING HF DSC COAST STATIONS FOR SEA AREAS A3 AND A4

- 1.1 The selection of HF DSC coast stations for sea areas A3 and A4 should be based on the following principles:
- .1 each ocean area requiring HF guard should have a minimum of two stations to provide the required HF cover;

- .2 where practicable, stations should be selected on opposite sides of an ocean area;
- .3 in ocean areas of high traffic density, e.g. the North Atlantic, more than two stations should be provided.

2 CRITERIA FOR THE SELECTION OF HF DSC STATIONS

2.1 Stations participating in HF DSC watchkeeping in the GMDSS should:

- .1 be affiliated to an RCC and have reliable communications by telephone and telex;
- .2 have long-range HF communication capability in all HF bands;
- .3 monitor all HF DSC distress frequencies to avoid the multiplication of communications links between RCCs as would be required if several stations divided the watchkeeping on different frequencies;
- .4 provide as complete a coverage of their ocean area as possible;
- .5 be in continuous operation;
- .6 be able to relay communications under a common procedure.

3 AVAILABILITY OF PARTICIPATING HF STATIONS

3.1 The minimum number of coast stations indicated in 1.1.1 for any given ocean area may need to be adjusted in future in order to:

- .1 provide full back-up in the event of operational failure;
- .2 confirm full HF coverage as a result of future tests.

Appendix 2 to annex 2

1 BASIC PRINCIPLES FOR ESTABLISHING SEA AREA A2

1.1 The selection of MF DSC coast stations for sea area A2 should be based on the following principles:

- .1 each sea area designated as A2 requires a continuous MF guard on the distress frequencies and a sufficient number of coast stations to provide MF coverage in the coastal area of the Government concerned;
- .2 in certain areas, several Governments may collectively provide complete coverage (e.g. the North Sea).

2 CRITERIA FOR PROVISION OF MF DSC STATIONS

2.1 Stations participating in MF DSC watchkeeping in the GMDSS should:

- .1 be affiliated to an RCC and have reliable communications by telephone and telex;
- .2 have medium-range MF capability;
- .3 provide as complete a coverage of their immediate sea area as possible; and
- .4 be in continuous operation.

Appendix 3 to annex 2

1 BASIC PRINCIPLES FOR ESTABLISHING SEA AREA A1

1.1 The selection of VHF DSC coast stations for sea area A1 should be based on the following principles:

- .1 each sea area designated as A1 requires a continuous VHF guard and should have a minimum number of stations to provide VHF coverage in the coastal area of the Government concerned;
- .2 in certain areas, several Governments may collectively provide complete coverage along their coasts (e.g. the North Sea).

2 CRITERIA FOR PROVISION OF VHF DSC STATIONS

2.1 Stations participating in VHF DSC watchkeeping in the GMDSS should:

- .1 be affiliated to an RCC and have reliable communications by telephone and telex;
- .2 have short-range VHF capability;
- .3 provide as complete a coverage of their immediate sea area as possible; and
- .4 be in continuous operation.

Annex 3

CRITERIA FOR ESTABLISHING GMDSS SEA AREAS

1 INTRODUCTION

It is intended that Governments should use the following criteria as guidance when determining the four mutually exclusive sea areas off their coasts, which are defined in regulations IV/2.12, IV/2.13, IV/2.14 and IV/2.15 of the 1974 SOLAS Convention, as amended in 1988.

2 SEA AREA A1

2.1 General

The communication range of stations operating in the maritime mobile VHF band is likely to be limited by propagation factors rather than lack of radiated power.

2.2 Guidance criteria

Sea area A1 is that sea area which is within a circle of radius A nautical miles over which the radio propagation path lies substantially over water. The radius A is equal to the transmission distance between a ship's VHF antenna at a height of 4 m above sea level and the antenna of the VHF coast station which lies at the centre of the circle.

2.3 Determination of radius A

2.3.1 The following formula should be used to calculate the range A in nautical miles:

$$A = 2.5(\sqrt{H \text{ (in metres)}} + \sqrt{h \text{ (in metres)}})$$

H is the height of the coast station VHF receiving antenna and h is the height of the ship's transmitting antenna which is assumed to be 4 m.

2.3.2 The following table gives the range in nautical miles (nm) for typical values of H :

h	H	50 m	100m
4 m		23 nm	30 nm

2.3.3 The formula given above applies to line-of-sight cases but is not considered adequate for cases where both antennae are at a low level. The VHF range in sea area A1 should be verified by field strength measurements.

3 SEA AREA A2

3.1 General

3.1.1 Consideration of the reception of radio signals in the 2 MHz band indicates that the range is likely to be limited by propagation conditions and atmospheric noise, which are affected by variations in geographical position and time of day, as well as radiated power.

3.1.2 The theoretical distance to be expected from ground wave propagation can be determined by reference to the "Ground-wave propagation curves: Sea Water" in CCIR Recommendation 368, adjusted as necessary to take account of the actual radiated field strength from the transmitting antenna and the minimum field strength necessary for the proper operation of a receiver conforming with resolution A.610(15).

3.1.3 The determination of the minimum signal level required for satisfactory radio reception in the absence of other unwanted signals necessitates taking account of the noise with which the wanted signal must compete. CCIR Report 322 gives the world distribution of values of noise level and of other noise parameters and shows the method of using these in the evaluation of the probable performance of a radio circuit.

3.2 Guidance criteria

Sea area A2 is that sea area which is within a circle of radius B nautical miles over which the propagation path lies substantially over water and which is not part of any sea area A1, the centre of the circle being the position of the coast station receiving antenna.

3.3 Determination of radius B

The radius B may be determined for each coast station by reference to CCIR Recommendation 368 and CCIR Report 322 for the performance of a single sideband (J3E) system under the following conditions:

Frequency	- 2182 kHz
Bandwidth	- 3 kHz
Propagation	- ground wave
Time of day	- 1
Season	- 1
Ship's transmitter power (PEP)	- 60 W ²
Ship's antenna efficiency	- 25%
S/N (RF)	- 9 dB (voice)
Mean transmitter power	- 8 dB below peak power
Fading margin	- 3 dB

The range of sea area A2 should be verified by field strength measurements.

¹ Administrations should determine time periods and seasons appropriate to their geographic area based on prevailing noise level.

² See footnote to regulation IV/16(c)(i) of the 1981 amendments to the 1974 SOLAS Convention.

4 AREA A3

4.1 Guidance criteria

Sea area A3 is that sea area of the world not being part of any sea area A1 or A2 within which the elevation angle of an INMARSAT satellite is 5° or more.

5 AREA A4

5.1 Guidance criteria

Sea area A4 is that sea area of the world not being part of any sea area A1, A2 or A3.

Annex 4

CRITERIA FOR USE WHEN PROVIDING A NAVTEX SERVICE

1 There are two basic areas which must be defined when establishing a NAVTEX service. They are:
Coverage area: An area defined by an arc of a circle having a radius from the transmitter calculated according to the method and criteria given in this annex.

Service area: A unique and precisely defined sea area, wholly contained within the coverage area, for which MSI is provided from a particular NAVTEX transmitter. It is normally defined by a line which takes full account of local propagation conditions and the character and volume of information and maritime traffic patterns in the region.

2 Governments desiring to provide a NAVTEX service should use the following criteria for calculating the coverage area of the NAVTEX transmitter they intend to install, in order to:

- determine the most appropriate location for NAVTEX stations having regard to existing or planned stations;
- avoid interference with existing or planned NAVTEX stations;
- establish a service area for promulgation to seafarers.

3 The ground-wave coverage may be determined for each coast station by reference to CCIR Recommendation 368 and CCIR Report 322 for the performance of a system under the following conditions:

Frequency	- 518 kHz
Bandwidth	- 500 Hz
Propagation	- ground wave
Time of day	- 1
Season	- 1
Transmitter power	- 2
Antenna efficiency	- 2
RF S/N in 500 Hz band width	- 8 dB ³
Percentage of time	- 90

4 Full coverage of NAVTEX service area should be verified by field strength measurements

¹ Administrations should determine time periods in accordance with NAVTEX time transmission table (NAVTEX Manual, figure 3) and seasons appropriate to their geographic area based on prevailing noise level.

² The range of a NAVTEX transmitter depends on the transmitter power and local propagation conditions. The actual range achieved should be adjusted to the minimum required for adequate reception in the NAVTEX area served, taking into account the needs of ships approaching from other areas. Experience has indicated that the required range of 250 to 400 nm can generally be attained by transmitter power in the range between 100 and 1,000 W during daylight with a 60% reduction at night.

³ Bit error rate 1×10^{-2} .