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**DISCLAIMER**

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**DRAFT MODERNIZATION PLAN OF  
THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)**

**Report of the Drafting Group**

**1 INTRODUCTION**

1.1 As instructed by the Sub-Committee, the Drafting Group (the Group) met on 7 and 8 March 2017, chaired by Mr. Robert Markle (United States).

1.2 The Group was attended by representatives from the following Member States:

CHINA	NORWAY
DENMARK	PHILIPPINES
FRANCE	REPUBLIC OF KOREA
GERMANY	ROMANIA
GREECE	RUSSIAN FEDERATION
JAPAN	SOUTH AFRICA
MARSHALL ISLANDS	SPAIN
MOROCCO	UNITED ARAB EMIRATES
NETHERLANDS	UNITED KINGDOM
NEW ZEALAND	UNITED STATES
NIGERIA	

1.3 The following United Nations specialized agencies were also represented:

INTERNATIONAL TELECOMMUNICATION UNION (ITU)

1.4 The Group was also attended by observers from the following intergovernmental organizations:

INTERNATIONAL MOBILE SATELLITE ORGANIZATION (IMSO)  
INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO)

1.5 The session was also attended by observers from the following non-governmental organizations in consultative status:

INTERNATIONAL TRANSPORT WORKERS' FEDERATION (ITF)  
COMITE INTERNATIONAL RADIO-MARITIME (CIRM)

## **2 TERMS OF REFERENCE**

2.1 The Group was instructed, taking into account decisions of, and comments and proposals made in plenary, to:

- .1 finalize the draft Modernization Plan of the GMDSS, using the annex of document NCSR 4/12 as the basic document, taking into account the relevant parts of documents NCSR 4/12/1 and NCSR 4/12/5;
- .2 prepare draft terms of reference for the Correspondence Group on the Modernization of the GMDSS for the intersessional work to be done between NCSR 4 and NCSR 5, as well as reporting to the 13th meeting of the Joint IMO/ITU Experts Group; and
- .3 submit a report on Thursday, 9 March 2017.

## **3 DRAFT MODERNIZATION PLAN FOR THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)**

3.1 As instructed by the Sub-Committee, the Group deleted the proposal on a revision of resolution A.1001(25) and MSC.1/Circ.1414, as well as the proposal on the development of performance standards for NAVDAT from the draft Modernization Plan, reorganized and finalized the draft plan accordingly.

3.2 The Group invited the Sub-Committee to endorse the draft Modernization Plan of the Global Maritime Distress and Safety System (GMDSS), as set out in annex 1, for approval by the Committee.

## **4 PROPOSAL FOR A NEW OUTPUT: REVISION OF SOLAS CHAPTERS III AND IV FOR MODERNIZATION OF THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS), INCLUDING RELATED AND CONSEQUENTIAL AMENDMENTS TO OTHER EXISTING INSTRUMENTS**

4.1 The Group included the proposal for a new output on the revision of SOLAS chapters III and IV for Modernization of the GMDSS, including related and consequential amendments to other existing instruments, as set out in annex 2, and invited the Sub-Committee to endorse it for approval by the Committee.

## **5 DRAFT TERMS OF REFERENCE FOR THE CORRESPONDENCE GROUP ON THE MODERNIZATION OF THE GMDSS**

5.1 The Group prepared the draft terms of reference for the Correspondence Group on the Modernization of the GMDSS, as set out in annex 3, and invited the Sub-Committee to approve it.

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**6 ACTION REQUESTED OF THE SUB-COMMITTEE**

6.1 The Sub-Committee is invited to:

- .1 endorse the draft Modernization Plan of the Global Maritime Distress and Safety System (GMDSS), for approval by the Committee (paragraph 3.2 and annex 1);
- .2 endorse the proposal for a new output on the revision of SOLAS chapters III and IV for Modernization of the GMDSS, including related and consequential amendments to other existing instruments, for approval by the Committee and consequential inclusion in the 2018-2019 biennial agenda of the NCSR Sub-Committee and the provisional agenda for NCSR 5, with a target completion year of 2022 in association with the HTW and SSE Sub-Committees as and when requested by the NCSR Sub-Committee (paragraph 4.1 and annex 2);
- .3 approve the draft terms of reference of the Correspondence Group on the modernization of the GMDSS (paragraph 5.1 and annex 3); and
- .4 approve the report in general.

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## ANNEX 1

### DRAFT OF THE MODERNIZATION PLAN FOR THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

#### Introduction

1 The Global Maritime Distress and Safety System (GMDSS) was adopted as part of the 1988 Amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS). It was fully implemented in 1999. It has served the mariner and the maritime industry well since its inception, but some of the GMDSS technologies used have not reached their full potential, and some GMDSS functions could be performed by more modern technologies.

2 In addition to ships required to meet GMDSS requirements under regulation IV/1 of the SOLAS Convention, other vessels (non-SOLAS vessels) also benefit from the GMDSS because search and rescue (SAR) communications are part of the GMDSS. Many national Administrations require non-SOLAS vessels<sup>1</sup> to be equipped with GMDSS equipment, or equipment compatible with the GMDSS including some of the recommendations and standards of the ITU and IEC. The existing GMDSS architecture ensures that a ship in distress anywhere should always be heard and responded to. It encompasses a unique combination of international technical and operational standards and recommendations, and further a globally coordinated use of frequencies, for both on board ships and on shore.

3 In 2012, the Maritime Safety Committee approved a new unplanned output on the Review and Modernization of the GMDSS (MSC 90/28, paragraph 25.18). The project includes a High Level Review (appendix 2), a Detailed Review (appendix 3), and then a Modernization Plan presented here, based on the earlier work.

4 A plan of work for the revision and development of legal instruments, performance standards and guidance material is given at appendix 1, and for which demonstration and documentation in accordance with MSC-MEPC.1/Circ.5 is given at annex 2. Other instruments being maintained or revised under other work items may include changes related to GMDSS Modernization. Additional instruments may be identified for revision or revocation with the approval of the Committee, as GMDSS Modernization proceeds, including those listed in the footnotes to regulation IV/14 of the Convention.

- .1 Performance standards should address the issue of user operability for end users such as deck officers. Familiarization to some current GMDSS installations can be a burden for those who operate the equipment. In order to minimize the burden, a certain level of unified user interface and easy operability for such installations should be taken into account;
- .2 annex 2 is a proposal for a new output on the revision of SOLAS chapters III and IV for *Modernization of the Global Maritime Distress and Safety System (GMDSS)*, including related and consequential amendments to other existing instruments. A list of these instruments is included as appendix 1 to annex 2;

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<sup>1</sup> See the International Convention for Safety of Life at Sea, 1974 (SOLAS), as amended, chapter I, regulations 1 and 3, and chapter IV, regulation 1.

- .3 At a future time, the *Criteria for the provision of mobile satellite communication systems in the Global Maritime Distress and Safety System (GMDSS)* (resolution A.1001(25) and MSC.1/Circ.1414) will need to be revised as a result of needed changes identified during the reviews of the Thuraya and Iridium satellite systems, as well as changes in Sea Area definitions anticipated in a revised SOLAS chapter IV; and
- .4 The revised SOLAS chapter IV is expected to allow for the use of a digital Navigational Data system (NAVDAT) for broadcasting maritime safety and security related information from shore-to-ship. When NAVDAT has been fully developed, a new performance standard for it will need to be prepared.

5 As a result of the Detailed Review, no new carriage or retrofit requirements for ships are proposed, other than consideration of a requirement for all lifeboats and at least some liferafts to be equipped with search and rescue locating devices (AIS Search and Rescue Transmitters (AIS-SART) or 9 GHz radar SART) is recommended. Some equipment will evolve over time to use newer technologies, and updates of equipment may be necessary as a result of decisions of future competent ITU World Radiocommunication Conferences (WRCs), e.g. if spectrum allocation and/or regulatory provisions are amended. Where new technologies are introduced, it is generally intended that ships can use existing equipment as long as that equipment is serviceable.

### **The Modernization Plan**

6 The Modernization Plan is based on the outline presented in section 17 of annex 7 to NCSR 3/29. The plan consists of the following components:

- .1 Overarching considerations;
- .2 Functional requirements: alignment with the Radio Regulations and other ITU-R documents;
- .3 Provision of GMDSS satellite services and redefinition of Sea Area 3;
- .4 VHF Data Exchange System (VDES);
- .5 NAVDAT;
- .6 Routing of distress alerts and related information;
- .7 Search and Rescue technologies;
- .8 HF Communications;
- .9 GMDSS carriage requirements;
- .10 False alerts;
- .11 Training;
- .12 Obsolete provisions; and
- .13 Clarifications

7 The plan of work is set out in appendix 1, and the proposed planned output, is set out in annex 2 to implement the actions required to complete the Modernization Plan. In this context, it was noted that several actions, indicated to be undertaken in this Plan, could be addressed under existing outputs and work items of the NCSR Sub-Committee.

### **Overarching considerations**

8 The GMDSS modernization process, including new and revised instruments, should not exclude non-SOLAS vessels from participating in the GMDSS for technical or economic reasons. Such instruments as affect non-SOLAS vessels should be compatible with the GMDSS (Detailed review paragraphs 17.4, 17.27 and 17.31).

9 IMO liaison statements to ITU-R must be guided by the principle that non-SOLAS vessels can make use of the GMDSS, and that the integrity of the GMDSS should be preserved, including if necessary, that ITU-R recommendations on GMDSS systems and frequency use are prescriptive (Detailed review paragraph 17.30).

10 The GMDSS modernization project needs to continue to support the needs of the e-navigation strategy (Detailed review paragraph 17.5).

11 The Human Element will be embodied both on board and ashore in the process to ensure that both the implementation of GMDSS Modernization and technology are fit for purpose.

12 In connection with the deliberations on the GMDSS Modernization process, the results and conclusions of the High Level Review, and the Detailed Review with related documents, will continue to guide the work (appendices 2 and 3).

### 13 Action required:

- .1 The overarching considerations need to be observed throughout the GMDSS Modernization project;
- .2 MSC/Circ.803 on *Participation of non-SOLAS ships in the GMDSS* should be reviewed and generally updated (reference to 2182 kHz alarm signal which has been removed in COLREG by resolution A.1004(25)/Rev.1); and
- .3 Make appropriate revisions to the relevant performance standards for the GMDSS equipment to address the user-friendliness of the GMDSS installations in order to reduce the burden on seafarers.

### **Functional requirements**

14 The functional requirements should be revised in accordance with the outcome of the High-level Review and the Detailed Review.

15 "Security communications" and "Other communications" should be added to the functional requirements in addition to the GMDSS functions (Detailed review paragraph 17.14).

16 The current functional requirements require ships to transmit and receive Maritime Safety Information, but by definition MSI is sent from shore stations and received by ships. Ships transmit and receive safety related information.

17 Definitions are also needed for "Security communications" and "Other communications", as well as requirements for radio installations to perform these functions (High-level Review paragraphs 5 to 12, and Detailed Review paragraph 17.11).

18 Action required: Update the GMDSS functional requirements in chapter IV of the Convention according to the High Level Review, including:

- .1 Review the revised functional requirements developed in the High Level Review to ensure that they are consistent with established definitions ITU-R recommendations and the Radio Regulations. Revise as necessary or prepare proposed revisions to ITU-R recommendations or Radio Regulations if appropriate;
- .2 Correct the functional requirements in chapter IV with respect to MSI and safety related information;
- .3 Add "Security communications" and "Other communications" to the functional requirements in addition to the GMDSS functions;
- .4 Add definitions for "Security communications" and "Other communications"; and
- .5 Align definitions and functional requirements in SOLAS chapter IV and MSC/Circ.1038 with ITU-R Recommendations and the Radio Regulations. Consider incorporating COMSAR/Circ.17 guidance in MSC/Circ.1038 revision.

### **Provision of GMDSS satellite services and redefinition of Sea Area A3**

19 The Maritime Safety Committee, at its eighty-eighth session (MSC 88), had considered documents MSC 88/8/1 and MSC 88/INF.4 (United Arab Emirates), containing information related to the recognition of new satellite providers within the GMDSS under the criteria of resolution A.1001(25). MSC 88 had noted that the United Arab Emirates had proposed that the Thuraya satellite system should be considered within the discussions on the GMDSS taking place in the COMSAR Sub-Committee under its agenda item "Scoping exercise to establish the need for a review of the elements and procedures of the GMDSS". After discussion, MSC 88 instructed COMSAR 15 to consider the matter under the above-mentioned agenda item.

20 The recognition of new satellite providers, including regional satellite service providers, has been taken into account in the project on the Review and Modernization of the GMDSS as instructed by MSC 88 and as a consequence of the application of the Iridium mobile-satellite system for recognition and use in the GMDSS.

21 Regarding the Thuraya Satellite System it has been noted that documents MSC 88/8/1 and MSC 88/INF.4 could be considered in the light of the outcome of the project on the Review and Modernization of the GMDSS, taking into account future work to be undertaken on the basis of the Modernization Plan. As suggested at MSC 88, IMSO might be requested to submit a report with regard to the conformity of the Thuraya Satellite System (MSC 88/26, paragraphs 8.14).



22 Amendments to SOLAS chapter IV are required to provide for additional recognized mobile satellite service[s] [providers] for use in the GMDSS. MSC 96 agreed to include this as a new output as a priority for NCSR 4. This work includes revision of certificates, so further action on this item under the Modernization Plan might not be required (Detailed review paragraph 17.6). However, revision of resolution A.1001(25) and MSC.1/Circ.1414 will be required in the future.

23 The definition of Sea Area A3 in SOLAS chapter IV should be revised to read:

"Sea area A3 means an area, excluding sea areas A1 and A2, within the coverage of a recognized mobile-satellite communication service supported by the ship earth station carried on board in which continuous alerting is available."

24 This redefinition is part of the expected SOLAS revisions described in paragraph 22, so further action on this item under the Modernization Plan might not be required (Detailed review paragraph 17.10).

25 There are consequential matters to be considered with regard to the new definition, and the effect on Sea Area A4. Sea Area A3 will be different for each different mobile-satellite communication service. Sea Area A4 is not redefined, but because it is the sea area not included in Sea Areas A1, A2, and A3, it will be different for ships using different mobile-satellite service providers and would not exist in the case of a satellite service provider with global coverage.

26 One important consequence of the new A3 definition is that it is now a purely satellite service area. The "HF alternative" is still available to a ship which operates beyond Sea Area A2 but does not use a recognized mobile-satellite communication service. Such ships will now be operating in Sea Area A4 which is no longer just polar regions. HF can also be used in Sea Area A3 as an additional means of alerting for a ship using a recognized mobile-satellite communication service.

27 A new generic performance standard for shipborne GMDSS equipment to accommodate additional providers of GMDSS satellite services is needed. MSC 95 agreed to include this in the 2016-2017 biennial agenda of the NCSR Sub-Committee. This work is underway, so no further action on this item under the Modernization Plan is required (Detailed review paragraph 17.6).

28 Additional satellite providers raise concerns about MSI messages via satellite.

29 Formatting of Enhanced Group Calling (EGC) should be standardized for the MSI Provider and SAR authority message originator to be the same irrespective of the satellite provider if possible to minimize delays (Detailed review paragraph 17.35). The Joint IMO/IHO/WMO MSI Manual provides guidance on standardization and harmonization of the format of MSI messages. The IAMSAR Manual, Volume II, provides guidance to SAR operators for formatting SAR related EGC. The International SafetyNET Manual includes coding which must be followed for preparing SafetyNET broadcasts, including SAR broadcasts. It is concluded that no further work is needed on standardized operational formatting. However, there will be a need in the near future for a standardized EGC adapted to a digital format.

30 If possible, a way should be found to transmit EGC simultaneously on all GMDSS satellite service providers (Detailed review paragraph 17.35). A solution suggested by the ICAO/IMO JWG on SAR (IMO/ITU EG 11/4/2), is to transmit EGC messages through one single point of distribution where message originators (MSI providers and SAR operators)

would deliver their messages. Those messages would then be forwarded to satellite service providers for broadcasting through their respective network. Remaining questions are, among others, who would operate, maintain and finance such a single point of distribution?

31 Possible ways for MSI providers to provide and monitor MSI broadcasts over multiple GMDSS satellite service providers should be identified with a view to minimizing or not increasing the cost for MSI providers. Resolution A.707(17) could be revised to provide for shore-to-ship MSI broadcasts without charge to the originator (Detailed review paragraph 17.36). Originators (MSI providers and SAR operators) are required to monitor the broadcast of their messages by every satellite service provider, and would experience increased costs if separate receivers were needed for this purpose. Recommendation ITU-T D.90 on *Charging, billing, international accounting and settlement in the maritime services* is of interest to the GMDSS satellite service providers as it lists the types of maritime communications for which no charges were raised, and is in alignment with the IMO requirements in Assembly resolution A.707(17).

32 The GMDSS Master Plan needs to be revised and an MSI manual or manuals prepared to include additional satellite service providers (Detailed review paragraph 3.22; partly paragraph 3.10). MSI manuals are now specific to the satellite service provider, but should be combined into a single generic manual. Both actions can be completed under the NCSR continuing work item on updating of the GMDSS master plan and Guidelines on MSI (maritime safety information) provisions.

33 Action required:

- .1 A new output is needed to:
  - .1 If not completed previously, revise definition of Sea Area A3;
  - .2 Revise resolution A.801(19) to include additional GMDSS satellite service providers, and to include the new definition for Sea Area A3;
  - .3 Revise resolution A.707(17) to take into account additional satellite providers; and
  - .4 If appropriate, consider who would operate, maintain and finance one single point of distribution where message originators (MSI providers and SAR operators) would deliver their messages.
- .2 Editorial revisions are required for the following:
  - .1 Resolution A.1051(27), resolution A.702(17), MSC.1/Circ.1364/Rev.1, MSC.1/Circ.1287/Rev.1, MSC.306(87), COMSAR.1/Circ.50/Rev.3, COMSAR/Circ.37, and COMSAR/Circ.32 – Remove references to "Inmarsat" and instead refer to "recognized mobile satellite service", as well as consequential revisions. Revise references to Sea Areas.

### **VHF Data Exchange System (VDES)**

34 The use of VDES needs to be considered in future possible mechanisms for the distribution of MSI (Detailed review paragraph 17.39).

35 Action required:

- .1 If sufficiently developed, a new output is required to prepare technical recommendations and performance standards for VDES service and ship equipment; and
- .2 The new output to revise chapter IV should allow ships to use VDES service where VDES is available.

### **NAVDAT**

36 The use of NAVDAT needs to be considered in future possible mechanisms for the distribution of MSI (Detailed review paragraph 17.8).

37 When the NAVDAT concept is sufficiently developed, IMO and ITU should develop the necessary technical recommendations and performance standards for international NAVDAT service. This work should be closely followed by the development of IMO, IHO, ITU, WMO and IEC standards as appropriate, for shipborne NAVDAT and/or combined NAVTEX/NAVDAT equipment (Detailed review paragraph 17.23, partly repeated in paragraph 17.29 and 17.33).

38 The need for a NAVDAT coordination scheme needs to be considered taking account that it should retain the existing NAVTEX service areas, but other aspects may not be compatible with the existing NAVTEX coordination scheme (allocation of transmission times, duration etc.).

39 Action required:

- .1 If sufficiently developed, a new output is required to prepare technical recommendations and performance standards for international NAVDAT service and ship equipment, including a coordination scheme; and
- .2 The new output to revise chapter IV should allow ships to use NAVDAT service in addition to or in place of NAVTEX in places where NAVDAT is available.

### **Routing of distress alerts and related information**

40 The issue of the routing of distress alerts and related information directly to the responsible RCC needs to be considered, taking also into account the possible use of the Cospas-Sarsat system for distribution of GMDSS digital distress alerts in addition to the current 406 MHz beacon alerts.

41 Action required:

- .1 A new output is needed to develop or revise appropriate instruments to ensure all distress alerts are routed directly to the responsible RCC that is capable of receiving them.

## Search and Rescue technologies

42 When considering amendments to the SOLAS Convention, a decision needs to be made as to whether all lifeboats, and whether some or all inflatable liferafts, should be equipped with installed search and rescue locating devices (AIS Search and Rescue Transmitters (AIS-SART) or 9 GHz radar SART), and how that requirement should be introduced, taking into account the regulatory scheme of survey and certification and the environmental conditions inside of the survival craft (liferaft equipment can only be accessed during servicing. Conditions inside may result in high or very low temperatures). (Detailed review paragraph 17.2).

43 Appropriate revisions need to be made to SOLAS chapter III and the "Record of Equipment" list in the certificates (Detailed review paragraph 17.3).

44 Member governments should continue to encourage voluntary carriage of VHF direction finders by ships and other craft entitled to fly their flag to detect 121.5 MHz signals and VHF marine band transmissions, emphasizing resolution A.616(15) *Search and rescue homing capability* and the IAMSAR manual (Detailed review paragraph 17.24).

45 Consideration should be given to the possible SAR benefits of the inclusion of text messaging, digital data, and chat messaging capabilities (Detailed review paragraph 17.25).

46 Resolution A.810(19) and related sections of SOLAS chapter IV need to be revised to address the Cospas-Sarsat transition to the MEOSAR system. The possibility to allow for the addition of an AIS technology locating device to the EPIRB should also be considered. Revision of this performance standard is already an agenda item for the NCSR Sub-Committee and may not need further consideration under the Modernization Plan.

47 MSC/Circ.1039 on *Guidelines for shore-based maintenance of satellite EPIRBs* needs to be revised to delete references to L-Band EPIRBs. MSC/Circ.1039 and MSC/Circ.1040/Rev.1 on *Guidelines on Annual Testing of 406 MHz Satellite EPIRBs* need to be revised, as appropriate, to include AIS locators, and reviewed for other needed changes in respect of Second Generation Beacons based on decisions made by NCSR.

48 Action required:

- .1 Consider requirements for search and rescue locating devices (AIS-Search and Rescue Transmitters (SART) or 9 GHz radar SART) in lifeboats and liferafts;
- .2 Revise SOLAS chapter III and Records of Equipment for locating technology for survival craft;
- .3 Continue discussion whether 121.5 MHz direction finders should be on certain categories of ships and if necessary prepare a circular;
- .4 Continue discussion on possible benefits of text messaging digital data, and chat messaging capabilities and if appropriate prepare resolution or circular for the purpose;
- .5 Update MSC/Circ.1039 on *Guidelines for shore-based maintenance of satellite EPIRBs*;
- .6 Update MSC/Circ.1040/Rev.1 on *Guidelines on Annual Testing of 406 MHz Satellite EPIRBs*; and
- .7 Revise references to "polar-orbiting" satellite system to reflect the current and future Cospas-Sarsat system.

## HF communications

49 The list of HF stations in the GMDSS Master Plan needs to be updated, including information on coast stations capable of receiving and responding to test messages. This work can be completed under the NCSR continuing work item on updating of the GMDSS master plan and Guidelines on MSI (maritime safety information) provisions. If possible ITU-R should be invited to carry out the technical studies to determine the number and distribution of stations required.

50 Based on these studies, the technical basis and the governance for determining the minimum number of HF GMDSS coast stations and their geographical distribution should be reviewed and, if necessary, consequential changes should be included in resolution A.801(19) (Detailed review paragraph 17.28).

51 Consider the future role for HF data exchange under ITU-R Recommendation 1798- 1 (Detailed review paragraph 17.32).

52 Guidance for coastal radio stations (CRS) should be established through the development of IEC standards based on IMO Guidelines (Detailed review paragraph 17.34).

53 Technological improvements can make HF easier to use. Consider revising resolutions A.806(19) and MSC.68(68), annex 3, to include a requirement for frequency scanning and/or Automatic Link Establishment (ALE) (Detailed review paragraph 17.40).

54 MSC.1/Circ.1460 should be revised to delete the references to HF radiocommunication equipment capable of operating NBDP. Alternatively it may be revoked since it relates to the 2012 revisions to the Radio Regulations, and by 2022 should not be needed any longer. The impact on Arctic NAVAREAs needs to be appreciated and fully discussed with all the relevant NAVAREAs before it should be finally recommended for removal as a SOLAS requirement, subject to the related provisions of the Polar Code.

55 Action required:

- .1 Decide on the future role of HF communications in the GMDSS;
- .2 Determine the technical basis and the governance for determining the minimum global number of HF GMDSS stations;
- .3 Consider revising resolutions A.806(19) and MSC.68(68), annex 3, to include a requirement for frequency scanning and/or Automatic Link Establishment (ALE);
- .4 Revise or revoke MSC.1/Circ.1460; and
- .5 Revise SOLAS chapter IV as appropriate.

## GMDSS Carriage Requirements

56 The GMDSS carriage requirements should be revised to implement the revised functional requirements, to ensure other changes in SOLAS chapter IV are implemented, to ensure consistency of the carriage requirements in general and to implement improvements in accordance with the findings of the High Level review and the Detailed Review.

57 Except for communications equipment installed or always carried in survival craft, the communications requirements for ships and life-saving appliances in chapter III, should be moved to chapter IV (Detailed review paragraph 17.1).

58 Action required:

- .1 Revise SOLAS regulations IV/6 to IV/11 to implement changes in SOLAS chapter IV including the functional requirements; and
- .2 Relocate requirements for GMDSS now in SOLAS chapter III to chapter IV.

### **False alerts**

59 No specific action has been identified to reduce false alerts and no determinations have been made at this stage as to which GMDSS equipment is most responsible for false alerts. However, EPIRBs and MF/HF DSC are recognized as transmitting a high number of false alerts under the current GMDSS. Measures should continue to be taken to guide/educate people on how to handle EPIRBs and MF/HF DSC equipment in order to avoid misactivation, including seafarers, operators, shipyards (both for building and recycling), inspectors and surveyors, emphasizing resolution A.814(19) on *Guidelines for the avoidance of false distress alerts*. Reduction of false alerts caused by human error should be addressed. For example, proper disposal of EPIRBs should be emphasized, including removal of the battery (Detailed review paragraph 17.22).

60 Action required:

.1 No specific new actions have been identified. Resolution A.814(19) on *Guidelines for the avoidance of false distress alerts* should continue to be implemented.

### **Training**

61 Training will be affected and amendments to STCW including Model Courses may be required. Model Courses will in general need to be revised to reflect the new Sea Area A3 definition and its effect on Sea Area A4, together with other amendments to chapter IV. Seafarer and shore personnel training will be affected and amendments to STCW may be required (Detailed review paragraph 17.26).

62 In addition to seafarer training, shore-based personnel training and operational requirements will be affected and amendments to the Radio Regulations, IAMSAR Manual, COMSAR/Circ.33 on the GMDSS Coast Station Operator's Certificate (CSOC) Model course might be required.

63 Action required:

- .1 Model courses need to be revised in accordance with GMDSS Modernization revisions under existing HTW work item on validated model training courses; and
- .2 Revise Radio Operator's Certificate and operational requirements.

## Obsolete provisions

64 Narrow band direct printing (NBDP) telegraph equipment can be removed as a required system, although existing devices can be permitted to remain in use to receive MSI, if a ship is not equipped with other equipment suitable for the purpose. MSI can be displayed on other bridge systems, including integrated navigation systems (INS) (Detailed review paragraph 17.7).

65 The VHF EPIRB should be removed from SOLAS chapter IV, and resolution A.805(19) revoked (Detailed review paragraph 17.16).

66 Remove the regulation IV/18 exemption for communication equipment from automatically receiving the ship's position if the ship is not provided with a navigation receiver (Detailed review paragraph 17.19).

67 COM/Circ.117, COM/Circ.110, and COM/Circ.105, providing clarifications of chapter IV should be considered for revocation.

68 Action required:

- .1 Make appropriate revisions to SOLAS chapter IV to eliminate obsolete provisions; and
- .2 Resolution A.805(19), COM/Circ.117, COM/Circ.110, and COM/Circ.105, should be considered for revocation.

## Clarifications

69 References to the International Radio Consultative Committee (CCIR) should be changed to the International Telecommunications Union (ITU-R) (Detailed review paragraph 17.12).

70 Terms and definitions should be harmonized with the Radio Regulations and other ITU-R documents. MSC/Circ.1038 should be revised with respect to "general communications" and may incorporate guidance in COMSAR/Circ.17.

71 Regulation IV/6.2.5 should be revised to clarify the "other codes" required to be clearly marked on the radio installation (Detailed review paragraph 17.15).

72 Revise and simplify regulations, such as IV/9.1.2, to reflect that separate DSC watch receivers are no longer common and modern equipment practice integrates the radio functions into a single installation (Detailed review paragraph 17.17).

73 Revise regulation IV/12.3 to reflect the decision to retain the VHF Channel 16 watch, as well as continuous listening watches is also in some areas for general communications including VTS, Maritime Assistance Service, coastal surveillance, ship reporting, port approaches etc. resolution MSC.131(75) and COMSAR/Circ.32 should be revised to reflect the correct Channel 16 listening watch requirement (Detailed review paragraph 17.18).

74 Review chapter IV for editorial improvements.

75 Action required:

- .1 Align definitions and functional requirements in SOLAS chapter IV and MSC/Circ.1038 with ITU-R and the Radio Regulations. Consider incorporating COMSAR/Circ.17 guidance in MSC/Circ.1038 revision;
- .2 Make appropriate clarifications to SOLAS chapter IV; and
- .3 Revise regulation IV/12.3, resolution MSC.131(75) and COMSAR/Circ.32 to reflect the correct Channel 16 listening watch requirement.



**APPENDIX 1**

**GMDSS MODERNIZATION PLAN**

**PLAN OF WORK FOR THE REVISION AND DEVELOPMENT OF  
LEGAL INSTRUMENTS, PERFORMANCE STANDARDS AND GUIDANCE MATERIAL**

The following reflects the required actions identified in the preceding discussion.

<b>Coordinated Plan of Work for the IMO GMDSS Modernization Project</b>				
<b>Y</b>	<b>Q</b>	<b>Meeting</b>	<b>Output</b>	<b>Year Deliverable</b>
<b>2018</b>	1	HTW 5	Consider issues related to the new outputs and, in particular, the checklists for considering human element issues and provide advice to NCSR 5, as appropriate.	First draft of the revision of SOLAS and related instruments.
	1	NCSR 5	Begin the revision of SOLAS chapters III and IV, including related and consequential amendments to other existing instruments.	
	1	SSE 5	Consider the outcome of NCSR 5 and take action, as appropriate.	
	2	MSC 99	No action foreseen.	
	3	EG 14	On the basis of the outcome of NCSR 5 [and an interim report of the CG], further consider the revision of SOLAS chapters III and IV, including related and consequential amendments to other existing instruments.	
	4	MSC 100	No action foreseen.	
<b>2019</b>	1	HTW 6	Consider the outcome of NCSR 5 and take action, as appropriate.	Second draft of the revision of SOLAS and related instruments.
	1	NCSR 6	Continue the revision of SOLAS chapters III and IV, including related and consequential amendments to other existing instruments, taking into account the [report of the CG and the] outcome of SSE 5, EG 14 and HTW 6.	
	1	SSE 6	Consider the outcome of NCSR 6 and take action, as appropriate.	
	2	MSC 101	No action foreseen.	
	3	EG 15	On the basis of the outcome of NCSR 6, SSE 6 [and an interim report of the CG], further consider the revision of SOLAS chapters III and IV, including related and consequential amendments to other existing instruments.	

2020	1	HTW 7	Consider the outcome of NCSR 6 and take action, as appropriate.	Final draft revision of SOLAS and related instruments.
	1	NCSR 7	Continue the revision of SOLAS chapters III and IV, including related and consequential amendments to other existing instruments, taking into account the [report of the CG and the] outcome of SSE 6, EG 15 and HTW 7.	
	1	SSE 7	Consider the outcome of NCSR 7 and take action, as appropriate.	
	2	MSC 102	No action foreseen.	
	3	EG 16	On the basis of the outcome of NCSR 7, SSE 7 [and an interim report of the CG], further consider the revision SOLAS chapters III and IV, including related and consequential amendments to other existing instruments.	
	4	MSC 103	No action foreseen.	
2021	1	HTW 8	Consider the outcome of NCSR 7 and take action, as appropriate.	Approved SOLAS amendments and related instruments.
	1	NCSR 8	Finalize the revision of SOLAS chapters III and IV, including related and consequential amendments to other existing instruments, taking into account the [report of the CG and the] outcome of SSE 7, EG 16 and HTW 8.	
	1	SSE 8	No agenda item required.	
	2	MSC 104	Approval of the SOLAS amendments and related instruments.	
	3	EG 17	No action foreseen.	
2022	1	HTW 9	No agenda item required.	Adopted SOLAS amendments (and related instruments, as appropriate).
	1	NCSR 9	No agenda item required.	
	1	SSE 9	No agenda item required.	
	2	MSC 105	Adoption of the SOLAS amendments (and related instruments, as appropriate).	
	3	EG 18	No action foreseen.	
	4	MSC 106	No action foreseen.	
2023			No action foreseen.	
2024				SOLAS revisions in force.

## APPENDIX 2

### OUTCOME OF THE HIGH LEVEL REVIEW OF THE GMDSS

(Approved by NCSR 1 on 4 July 2014 (NCSR 1/28, paragraph 13.5.14) and noted by MSC 94 (MSC 94/21, paragraphs 9.25 to 9.27)

#### Introduction

1 The Maritime Safety Committee, at its ninetieth session, approved an unplanned output on "Review and modernization of the Global Maritime Distress and Safety System (GMDSS)", with a target completion year of 2017. In accordance with the work plan, this report is the final report on the outcome of the High-level Review as approved by the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR), at its first session (30 June to 4 July 2014).

2 The work plan provides for this High-level Review to be followed by a Detailed Review. The Sub-Committee on Navigation, Communication and Search and Rescue (NCSR) and its correspondence group performed the High-level Review, with the participation of the Joint IMO/ITU Experts Group on Maritime Radiocommunication Matters (Experts Group).

3 The High-level Review was limited to the following over-arching issues concerning the GMDSS:

- .1 review of the existing nine functional requirements, including:
  - .1 the possible need for inclusion of security-related communications in the GMDSS; and
  - .2 the consideration of the possible need to develop a clearer definition of "General Communications", which is continuing to cause confusion and consider if this category should be included within the requirements of the GMDSS;
- .2 the need for the current order of priorities in use for radiocommunications;
- .3 the future need for the four different areas of carriage requirements (sea areas A1 to A4), and port State control procedures if sea areas are changed;
- .4 the future need to allow for differences for certain categories of ships, including non-SOLAS ships;
- .5 whether distress communications should be separated from other types of communications and in consequence whether the arrangements in chapters in SOLAS could be revised (Note: chapter II, (part D Electrical installations), chapter III, (part B in several instances), chapter V in various instances including e-navigation applications);
- .6 possible alignment between chapters III, IV, V and XI-2 of SOLAS, in particular, with regard to type approval, secondary equipment and maintenance arrangements and their regulatory status (i.e. mandatory or discretionary); and
- .7 assess whether to increase the use of goal-based methodologies when reviewing the regulations and regulatory framework for GMDSS in SOLAS chapters IV and V and the STCW Convention, to provide flexibility to allow the GMDSS to adapt to new and evolving technologies without major revision of the SOLAS and STCW Conventions in future.

### **Review of the existing nine functional requirements**

4 The current regulation IV/4 of SOLAS requires that every ship,<sup>2</sup> while at sea, shall be capable:

- .1 except as provided in regulations 8.1.1 and 10.1.4.3, of transmitting ship-to-shore distress alerts by at least two separate and independent means, each using a different radiocommunication service;
- .2 of receiving shore-to-ship distress alerts;
- .3 of transmitting and receiving ship-to-ship distress alerts;
- .4 of transmitting and receiving search and rescue coordinating communications;
- .5 of transmitting and receiving on-scene communications;
- .6 of transmitting and, as required by regulation V/19.2.3.2, receiving signals for locating;
- .7 of transmitting and receiving maritime safety information;
- .8 of transmitting and receiving general radio communications to and from shore-based radio systems or networks subject to regulation 15.8; and
- .9 of transmitting and receiving bridge-to-bridge communications.

### **Security-related communications**

5 Requirements for maritime security are given in SOLAS chapter XI-2. The Ship Security Alert System (SSAS) does not involve communication with other ships or with coast radio stations. Therefore, those communications are neither ship-to-ship nor ship-to-shore communications. Communications are addressed to a designated competent authority. Therefore, security-related communications should not be a functional requirement of the GMDSS but chapter IV should include a requirement for ships to be capable of security related communications, and a definition of "security-related communications" is also required.

6 Therefore, a definition of "security-related communications" is proposed to be added to regulation IV/2, as follows:

"Security-related communications means communications associated with the update of security levels, security incidents or threat thereof and security-related information prior to the entry of a ship into a port."

7 Security information is occasionally transmitted as maritime safety information (MSI). Security-related requirements are already included in paragraph 4.2.2.17 of the Joint IMO/IHO/WMO Manual on Maritime Safety Information (MSI Manual). A revision to the definition of MSI, therefore, is not required.

### **General communications**

8 The existing definition in SOLAS regulation IV/2.1.5, defines general radio communications as "operational and public correspondence traffic, other than distress, urgency and safety messages conducted by radio."

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<sup>2</sup> Under the general applicability requirements of the SOLAS Convention as well as regulation IV/1.1, "every ship" means cargo ships over 300 gross tonnage and passenger ships, on international voyages.

9 Coast radio stations (Government owned) which provided public correspondence facilities when the GMDSS was first designed have now all largely closed down. However, facilities for public correspondence are still required. These communications are now being achieved using commercial services which are not normally associated with coast radio stations and the term public correspondence is no longer widely used. For the Modernized GMDSS it is therefore proposed to change the term Public correspondence to "Other communications" and include a new capability for Other communications but not as part of the GMDSS functional requirements.

10 The definition of urgency and safety communications is given in article 33 of the Radio Regulations and now includes the following communications:

- .1 navigational and meteorological warnings and urgent information;
- .2 ship-to-ship safety of navigation communications;
- .3 ship reporting communications;
- .4 support communications for search and rescue operations;
- .5 other urgency and safety messages; and
- .6 communications relating to the navigation, movements and needs of ships and weather observation messages destined for an official meteorological service.

Operational communications is now, therefore, covered under the definition of urgency and safety communications.

11 It is proposed to redefine the term "General communications" by aligning it with the Radio Regulations. The new definition proposed is:

"General communications means operational communications, other than distress conducted by radio."

12 MSC/Circ.1038 on Guidelines for general communications will need to be revised or withdrawn to reflect this change.

### **Maritime Safety Information (MSI)**

13 A further issue that was identified during the review involved Maritime Safety Information (MSI).

14 Under the existing definition in SOLAS regulation IV/2.1.9, "Maritime safety information" means navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages broadcast to ships. This definition is also consistent with the Radio Regulations and performed by a shore base service and there is no need to revise the current definition of MSI in SOLAS regulation IV/2. However, in order to align the SOLAS definition with the common use of the term "MSI", and as a consequence the use of this term in other documents, the need was identified to include the abbreviation "MSI" in SOLAS regulation IV/2, by the following editorial amendment: "Maritime Safety Information (MSI) means navigational and ....."

15 The existing functional requirement No.7 however, requires that ships have a capability to transmit and receive maritime safety information. This capability results from requirements in SOLAS V for ships to transmit danger messages.

16 It is therefore, proposed to add a new functional requirement for ships to be capable of transmitting and receiving safety-related information, whilst retaining the functional requirement for ships to receive MSI.

### **Proposed functional requirements for the Modernized GMDSS**

17 The new text of regulation IV/4 is proposed as follows:

- .1 Every ship, while at sea, shall be capable of:
  - .1 performing the Global Maritime Distress and Safety System (GMDSS) functions as follows:
    - .1 transmitting ship-to-shore distress alerts by at least two separate and independent means, each using a different radiocommunication service;
    - .2 receiving shore-to-ship distress alert relays;
    - .3 transmitting and receiving ship-to-ship distress alerts;
    - .4 transmitting and receiving search and rescue coordinating communications;
    - .5 transmitting and receiving on-scene communications;
    - .6 transmitting and receiving signals for locating;
    - .7 transmitting and receiving safety-related information;
    - .8 receiving Maritime Safety Information (MSI);
    - .9 transmitting and receiving general communications; and
    - .10 transmitting and receiving bridge-to-bridge communications;
  - .2 transmitting and receiving security-related communications, in accordance with the requirements of the International Ship and Port Facility Security Code; and
  - .3 transmitting and receiving other communications to and from shore-based systems or networks.

### **Order of priorities in use for radiocommunications**

18 The Radio Regulations provide the existing order of four levels of priority, as follows:

- .1 Distress calls, distress messages and distress traffic.
- .2 Urgency communications.
- .3 Safety communications.
- .4 Other communications.

19 The four priorities are needed for communications and operational use in general, including voice, maritime safety information, as well as other text and data messages. Priorities for text and data messages can be used to sort message displays in order of importance or the way in which they are displayed. However, two priorities are sufficient for controlling the radiocommunication link, for example by using pre-emption.

20 It is concluded, therefore, that the four levels of priority should be retained, and apply to voice, text, and data messages and that there is no need to revise article 53 of the Radio Regulations. Automated systems should give priority to category 1 as required in article 53.2. Automated systems should also give priority to categories 2 and 3 (ahead of category 4), but this would not be in conflict with article 53.

### **Future need for the four different areas of carriage requirements**

#### Existing definitions

21 SOLAS regulation IV/2 defines the existing sea areas:

"Sea area A1" means an area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government.

"Sea area A2" means an area, excluding sea area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government.

"Sea area A3" means an area, excluding sea areas A1 and A2, within the coverage of an INMARSAT geostationary satellite in which continuous alerting is available.

"Sea area A4" means an area outside sea areas A1, A2 and A3.

#### Sea area A1

22 During the High-level Review it was noted that extensive use was made of VHF communications and, therefore, sea area A1 should be retained.

#### Sea area A2

23 Equipment available for terrestrial communication on board ships is invariably combined MF/HF transceivers which are suitable for use in sea areas A2 and A3. The combination of those two areas was considered, however, it was noted that considerable use is made of MF voice communications. Furthermore, there are also different maintenance requirements for sea areas A2 and A3, and it was finally concluded that sea area A2 should be retained as a separate sea area.

#### Sea areas A3 and A4

24 The definition of the boundary between sea area A3 and A4 is currently defined by Inmarsat coverage, but Inmarsat might not always be the only GMDSS satellite provider. In future, the Organization might recognize regional or global satellite systems to provide GMDSS services in an A3 sea area, each of them providing coverage different to the current A3 sea area.

25 It is noted that sea areas A3 and A4 are defined by the Organization, whereas A1, which is related to VHF coverage, and A2, which is related to MF coverage, are defined by Contracting Governments.

26 It was considered that HF should remain a requirement for sea area A4 and an option for sea area A3, excluding any special requirements which might be developed under the Polar Code.

27 It was noted that there may be difficulties to relay distress alerts when a large number of providers would offer services through different systems, as SAR authorities would not know what particular equipment is on any particular ship.

28 One way for differentiating between sea areas A3 and A4 which was considered, is that sea area A3 is related to satellite coverage and sea area A4 is related to HF.

29 References to "Inmarsat" throughout SOLAS chapter IV will need to be changed to refer to "recognized mobile satellite communication service", to be consistent with terminology in resolution A.1001(25).

#### Options for the definition of sea areas A3 and A4

30 Recognizing that other options for the definition of sea areas A3 and A4 could be developed, three different options for the definition of sea areas A3 and A4 (SOLAS regulation IV/2.14) were identified as follows:

##### OPTION 1:

"Sea area A3" means an area, excluding sea areas A1 and A2, within the coverage of a recognized mobile satellite communication service using geostationary satellites in which continuous alerting is available.

"Sea area A4" means an area outside sea areas A1, A2 and A3.

##### Comments on Option 1:

- .1 Option 1 is the most similar to the current SOLAS definition, except that the reference to Inmarsat has been deleted.
- .2 Option 1 does not facilitate the introduction of non-geostationary satellite systems.
- .3 The boundary between sea areas A3 and A4 would depend upon the satellite system used and could be different for different ships.

##### OPTION 2:

"Sea area A3" means an area, excluding sea areas A1 and A2, within the coverage of a recognized mobile satellite communication service in which continuous alerting is available between [70][76] degrees North and South.

"Sea area A3-[R][Region][Regional][Sub]" means a sub-area within sea area A3, within the regional coverage of a recognized mobile satellite communication service in which continuous alerting is available.

"Sea area A4" means an area outside sea areas A1, A2 and A3.

"Sea area A4-R" means a sub-area within sea area A4, within the regional coverage of a recognized mobile satellite communication service in which continuous alerting is available.

##### Comments on Option 2:

- .1 Option 2 defines a clear boundary for the A3 sea area and, as such, might be helpful to an Administration in issuing safety radio certificates to ships.



### OPTION 3:

"Sea area A3" means an area, excluding sea areas A1 and A2, within the coverage of a recognized mobile satellite communication service in which continuous alerting is available as may be defined by the Organization.

"Sea area A4" means an area outside sea areas A1, A2 and A3.

#### Comments on Option 3:

- .1 Option 3 defines the sea area A3 as somewhere where satellite coverage is available.
- .2 The boundary between sea areas A3 and A4 would depend upon the satellite system used and could be different for different ships.
- .3 The safety radio certificate would require details of the geographical area in which the ship is permitted to sail.
- .4 Availability of a global satellite system would result in not having a sea area A4 for ships that are certificated to use a global system.

#### Port State control procedures if sea areas are changed

31 In future, if other satellite service providers are recognized by the Organization, the safety radio certificates of the ship should be required to define the geographic area in which the ship is permitted to operate. The detail of the geographical areas covered by all the different satellite service providers will be given in the GMDSS Master Plan.

#### Follow up

32 The definition of the different areas of carriage requirements (sea areas) and port State control procedures will be further considered under the Detailed Review.

#### **Separation of distress communications from other types of communications**

33 As described in paragraph 17 it was concluded that "security-related communications" and "other communications" could be separated from distress and safety communications. No further revisions to the arrangements in other chapters of SOLAS were considered to be necessary at this time.

#### **Future need to allow for differences for certain categories of ships, including non-SOLAS ships**

34 After WRC-07, articles 30 through 34 of the Radio Regulations contain provisions for operational use of the GMDSS, which apply to all ships of all types. SOLAS chapter IV includes GMDSS radio equipment requirements and applies to cargo ships of 300 gross tonnage and upwards and to passenger ships, on international voyages. Under regulation I/3, the following types of ships are excluded:

- .1 ships of war and troopships;
- .2 cargo ships of less than 500 gross tonnage (note: this exemption is expressly brought down to 300 gross tonnage in chapter IV);

- .3 ships not propelled by mechanical means;
- .4 wooden ships of primitive build;
- .5 pleasure yachts not engaged in trade; and
- .6 fishing vessels.

The Organization also has Codes (DSC, SPS, MODU and HSC Codes) and other instruments such as the Torremolinos International Convention for the Safety of Fishing Vessels, 1977 (with its 1993 Protocol and the 2012 Cape Town Agreement) containing requirements for carriage of radio equipment for certain other types of ships.

35 It was suggested that one way to bring consistency to the GMDSS across all types of ships would be to create a GMDSS Code, which could be applied as mandatory to ships under SOLAS chapter IV, as well as various codes. It could be advisory for other types of ships and serve as a recommendation to governments for application to their domestic services.

36 However, it was concluded that at the present time, there is no compelling case for the development of a GMDSS Code. Developing such a code would require addressing the complex issues that would arise from the various instruments that require the carriage of radio equipment. Each of these would then need to be revised to reference the code.

37 Further items for possible consideration in the Detailed Review could include:

- .1 relating distress signals in COLREGs to SOLAS chapter IV and requiring SOLAS Convention vessels to relay a distress alert from non-Convention vessels to shore;
- .2 the need for all equipment working in the GMDSS system to be type approved, to ensure that it meets compatible standards;
- .3 reduction in the applicable tonnage limits for SOLAS chapter IV, applicable functional requirements to non-Convention ships as currently defined, maintenance of equipment and qualification of personnel; and
- .4 use of personal devices, such as Man Overboard Devices (MOBs), etc. and protection of the integrity of the GMDSS.

#### **Review of existing systems considered for replacement, and existing and new systems for inclusion in the modernized GMDSS**

38 A number of new communication technologies and systems have been developed since the introduction of the GMDSS, which are currently not included in the GMDSS. They offer potential improvements and advantages. The following equipment and systems, among others, might be included in the modernized GMDSS:

- .1 AIS;
- .2 HF email and data systems;
- .3 VHF data systems;
- .4 Application Specific Messages over AIS;

- .5 NAVDAT (500 kHz and/or HF);
- .6 Modern satellite communication technologies;
- .7 Additional GMDSS satellite service providers;
- .8 Hand-held satellite telephones in survival craft;
- .9 Hand-held VHF with DSC and GNSS for survival craft;
- .10 Man Overboard Devices;
- .11 Cospas-Sarsat MEOSAR system; and
- .12 AIS and GNSS-equipped EPIRBs.

39 Other systems including mobile internet services, mobile telephone services, broadband wireless access (BWA), e.g. Wimax/mesh networks wireless Local Area Networks and non-regulated Satellite Emergency Notification Devices (SENDS), are more and more used by the public including non-SOLAS ships. These systems do not seem to have a place in the modernized GMDSS.

40 It was therefore concluded that there are a number of new communication systems and equipment that might be part of a modernized GMDSS. However, until the Detailed Review of the GMDSS is completed it is too early to decide which systems and equipment would or would not be included. Similarly, it is too soon to decide which systems, relying on older or inefficient technologies, might be considered for replacement by more modern systems.

#### **Possible alignment between chapters III, IV, V and XI-2 of SOLAS and the use of goal-based methodologies**

41 There are differences in arrangements with regard to type approval, secondary equipment and maintenance arrangements and the regulatory status in SOLAS chapters III, IV, V and XI-2. Other SOLAS chapters are also trending toward using goal-based methodologies in order to provide the maximum possible flexibility for designers, and to allow for innovation.

42 With respect to the GMDSS and communications in general, interoperability is required between ships and between ships and shore stations. In the course of the High-level Review, as well as in the work on the e-navigation strategy, there have been numerous calls for standardized user interfaces.

43 However because of the need for interoperability of radio communications between ships and between ships and shore stations, as well as the need for consistent user interfaces, alignment with other SOLAS chapters and the use of goal-based methodologies is not appropriate.

## APPENDIX 3

### OUTCOME OF THE DETAILED REVIEW OF THE GMDSS

(Approved 20 May 2016 (see MSC 96/25, paragraph 14.9))

#### 1 Introduction

1.1 The Global Maritime Distress and Safety System (GMDSS) was adopted as part of the 1988 Amendments to the Safety of Life at Sea Convention (SOLAS). It was fully implemented in 1999. It has served the mariner and the maritime industry well since its inception, but some of the GMDSS technologies used have not reached their full potential and some GMDSS functions could be performed by more modern technologies.

1.2 In addition to ships required to meet GMDSS requirements under regulation IV/1 of the SOLAS Convention, other vessels (non-SOLAS vessels) also benefit from the GMDSS because search and rescue (SAR) communications are part of the GMDSS. Many national Administrations require non-SOLAS vessels to be equipped with GMDSS equipment, or equipment compatible with the GMDSS including some of the recommendations and standards of the ITU and IEC. The existing GMDSS architecture ensures that a ship in distress anywhere should always be heard and responded to. It encompasses a unique combination of international technical and operational standards and recommendations, and further a globally coordinated use of frequencies, for both on board ships and on shore.

1.3 In 2012, the Maritime Safety Committee approved a new unplanned output on the Review and modernization of the GMDSS (MSC 90/28, paragraph 25.18). The project includes a High-level Review (NCSR 1/28, Annex 10), a Detailed Review (this report) and a Modernization Plan. The work was initially coordinated by the Sub-Committee on Radiocommunications, and Search and Rescue (COMSAR), with contributions from the Sub-Committee on the Safety of Navigation (NAV), and the Joint IMO/ITU Experts Group on Maritime Radiocommunication Matters (Experts Group). In 2013, the COMSAR and NAV Sub-Committees were merged into the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) which carries on the work along with the Sub-Committee on Human Element, Training and Watchkeeping (HTW), and supported by the Experts Group and the ICAO/IMO Joint Working Group on Harmonization of Aeronautical and Maritime Search and Rescue.

1.4 This Detailed Review took place from 2013 to 2016. It builds on the outcome of the High-level Review of the GMDSS (NCSR 1/28, Annex 10) and sets the agenda for the Modernization Plan. As a result of the Detailed Review, no new carriage or retrofit requirements for ships are proposed, although consideration of a requirement for all lifeboats and at least some liferafts to be equipped with SARTs is recommended. Some equipment will evolve over time to use newer technologies, and updates of equipment may be necessary as a result of decisions of future competent ITU World Radiocommunication Conferences (WRCs), e.g. if spectrum allocation and/or regulatory provisions are amended. Where new technologies are introduced, it is generally intended that ships can use existing equipment as long as that equipment is serviceable.

#### 2 Additional satellite systems in the GMDSS

2.1 Inmarsat has been the sole provider of GMDSS satellite communication services since the inception of the GMDSS. Resolution A.1001(25) sets out the criteria for the provision of mobile satellite communication systems in the GMDSS and reflects that the Assembly had noted that future mobile satellite communication systems might have the potential to offer maritime distress and safety communications. Resolution A.1001(25) did not anticipate all of the issues that might arise with the introduction of additional satellite systems.

### *Interoperability*

2.2 Concerns were expressed about interoperability, referring to "the ability to conduct ship-to-ship, ship-to-shore, and shore-to-ship communications without regard to differing satellite systems in use by the communicating stations". However, when resolution A.1001(25) was developed, the issue of interoperability was discussed in depth, and it was recognized that this would mean more complexity than when operating with a single provider. This is actually not a new situation raised by the introduction of additional GMDSS satellite service providers. For instance, it is not necessary for a Rescue Coordination Centre (RCC) to have an Inmarsat terminal to communicate with a ship using the Inmarsat satellite system. The connection can be completed through the Public Switched Telephone Network (PSTN), although dedicated land lines may also be used. Similarly, current SafetyNET Maritime Safety Information (MSI) providers do not need to have Inmarsat terminals to provide their broadcasts. This would also be the case for additional satellite systems. Ships with different satellite systems are also connected to each other through the PSTN as well as the terrestrial radio services required in SOLAS regulations IV/10.1.2 and 10.2.

2.3 However, NAVAREA coordinators, Sub-Area coordinators and national coordinators under resolution A.706(17), and METAREA coordinators and issuing services under resolution A.1051(27), are required to monitor their broadcasts to ensure that the messages have been correctly transmitted. These requirements are typically met by having the relevant satellite terminals.

2.4 RCCs, as well as NAVAREA and METAREA coordinators, make use of Enhanced Group Calls (EGC). These would have to be duplicated on each GMDSS satellite service. Furthermore, there is no standard EGC message format, so it is possible that EGC messages may have to be reformatted for different satellite systems. This could cause delays where time is of the essence, such as a distress alert relay on short notice.

2.5 Other concerns were raised on using the PSTN and Internet Protocol (IP) for prioritized distress communications. IP telephony and communication, has become more extensively used, but may be more vulnerable than existing PSTN networks. Satellite communications are dependent on shore-to-shore communication systems in use whether PSTN or any other landline links. The current system sometimes relies on the PSTN, but a standard PSTN line or similar may not be sufficient for any shore-based GMDSS communications. In the early Inmarsat-C implementation days there was a requirement that a dedicated (leased) line should be available between the land earth station (LES) and the Rescue Coordination Centre (RCC). Dedicated communication lines or other high availability and reliability connections may be necessary for the shore based network.

### *Cost implications*

2.6 Inmarsat charging policies are covered in resolution A.707(17), which recommends that coast earth stations not be charged for:

- ship-to-shore and shore-to-ship distress traffic;
- urgent ship-to-shore navigational and meteorological danger reports using record communications; and
- medical assistance for persons in grave and imminent danger.

2.7 Furthermore, resolution A.707(17) recommends that ships not be charged for:

- meteorological reports;
- ship position reports; and
- medical advice and assistance messages other than those referred to in paragraph 2.6.

2.8 The same charging policies should apply to any new GMDSS satellite service provider.

2.9 Land stations and ships typically subscribe to Inmarsat services and pay additionally for the amount of voice and data services they receive or transmit, other than those listed in paragraphs 2.6 and 2.7. The addition of new satellite service providers should allow users to compare service plans and charges, which might result in reduced expenses for them, and might result in a wider range of available services.

2.10 Cost implications for SAR authorities should not change because they should not be charged for distress traffic. They should also not have to install additional mobile earth stations, because they will be able to communicate with ships served by new GMDSS satellite service providers, using existing hardware and systems because they should all be interoperable. However, they may find that it is more efficient to have their own mobile earth station for each GMDSS satellite service provider.

2.11 There could be cost implications for MSI providers. With the exception of urgent ship-to-shore navigational and meteorological danger reports, they pay Inmarsat for the SafetyNET broadcasts. It is to be expected that any new satellite service provider would impose comparable charges. Because the MSI providers would have to provide their broadcasts over all GMDSS satellite systems, the addition of one new satellite service provider could double their costs. A third could triple their costs. A solution would be to add MSI broadcasts to the resolution A.707(17) list that MSI providers are not charged for (see paragraph 2.6). This would mean that satellite service providers would have to recover their costs for this service from the basic subscription fees paid by coast earth stations and ship stations, and consequently those fees might increase.

2.12 Unless there is a reliable way for NAVAREA coordinators, Sub-Area coordinators, national coordinators, and METAREA coordinators and issuing services to monitor their broadcasts indirectly, they would need to obtain and operate terminals for any new GMDSS satellite service provider.

#### *Frequency coordination*

2.13 Concern was expressed regarding frequency coordination. Coordination should be carried out in accordance with the relevant procedures of the Radio Regulations. Any additional necessary frequency coordination should be able to be carried out at WRC-19 to avoid delays in the GMDSS modernization programme. An agenda item to support the introduction of an additional satellite provider into the GMDSS has been included in the agenda of WRC-19.

#### *ITU List V and MARS Database*

2.14 Resolution A.887(21) covers the establishment, updating and retrieval of information in GMDSS databases. This recommendation provides in paragraph 7 of the annex that "all Inmarsat equipment should be registered with Inmarsat". The implication is that Inmarsat

identities do not need to be included in the databases, even though paragraph 8.11 says that they should include "radio installations (Inmarsat-A, B, C, M, VHF DSC, etc.) for ship and survival craft".

2.15 When records in the MARS database are examined, it is apparent that some ship listings include their Inmarsat identities, and others do not.

2.16 Resolution A.887(21) should be revised to apply to all GMDSS satellite service providers. It is preferred that satellite service provider identities be included in databases such as List V in MARS.

#### *Implications for the Modernization Plan*

2.17 SOLAS chapter IV should be revised to provide for other GMDSS satellite service providers in addition to Inmarsat.

2.18 Possible ways for MSI providers to provide and monitor MSI broadcasts over multiple GMDSS satellite service providers should be identified, with a view to minimizing the costs, or at least the cost increases for MSI providers. Resolution A.707(17) could be revised to provide for shore-to-ship MSI broadcasts without charge to the originator.

2.19 Formatting of EGC should be standardized if possible to minimize delays and if possible, a way should be found to transmit EGC simultaneously on all GMDSS satellite service providers.

2.20 Resolution A.887(21) should be clarified so as to ensure that satellite service provider identities are included in national databases and List V in MARS.

2.21 IMO instruments applying to Inmarsat should be reviewed and should be revised, if appropriate, to apply to all GMDSS satellite service providers. See the annex for a listing of instruments that are affected.

### **3 Redefinition of Sea Area A3**

3.1 The High-level Review developed several options for revising the definition of Sea Area A3, and left the final decision to the Detailed Review. The revised definition of Sea Area A3 will be:

"Sea area A3 means an area, excluding sea areas A1 and A2, within the coverage of a recognized mobile-satellite communication service supported by the ship earth station carried on board in which continuous alerting is available."

3.2 The Communications Working Group at NCSR 2 (NCSR 2/WP.5) identified consequential matters to be considered with regard to the new definition, and the effect on Sea Area A4. Sea Area A3 will be different for each different mobile-satellite communication service. Sea Area A4 is not redefined, but because it is the sea area not included in Sea Areas A1, A2, and A3, it will be different for ships using different mobile-satellite service providers, and would not exist in the case of a satellite service provider with global coverage.

### *HF carriage requirements*

3.3 One important consequence of the new A3 definition is that it is now a purely satellite service area. The "HF alternative" is still available to a ship which operates beyond Sea Area A2 but does not use a recognized mobile-satellite communication service. Such ships will now be operating in Sea Area A4 which is no longer just polar regions. HF can also be used in Sea Area A3 as a secondary means of alerting for a ship using a recognized mobile-satellite communication service.

### *Promulgation of MSI by HF*

3.4 Because the new definition of Sea Area A3 has the consequence that Sea Area A4 is not restricted to the polar areas, careful consideration should go into how it is ensured that the required MSI will be available to all ships, regardless of their choice of equipment and area of operation.

3.5 Currently, with Inmarsat as the only satellite provider for GMDSS, it is assumed that MSI will be available through the Inmarsat EGC service in areas outside NAVTEX coverage (except for the polar areas). In the future, additional satellite providers may become part of GMDSS, and consequently the issue will become slightly more complex. However, this issue is not only related to the modernization process but also to the recognition of new satellite service providers in the existing GMDSS.

3.6 It is not known whether EGC-receive-only equipment will be available for the new satellite systems. If that would be the case, the modernized GMDSS would not require significant changes to the current use of HF MSI. Decisions and assumptions for the availability of "New EGC" and "New EGC-receive-only-equipment" should be made in order to decide on which carriage requirements should be included in the revised SOLAS chapter IV.

3.7 Nevertheless, it would be valuable if the modernized GMDSS would provide for better and more user-friendly means for ships to receive HF MSI and, thereby, giving additional flexibility to the shore-based infrastructure on how MSI is chosen to be distributed. It could, therefore, be considered whether it would be feasible to require "Future NAVTEX receivers" to be combined NAVTEX and NAVDAT receivers, and that they would be required to receive on 490, 500 and 518 kHz and additionally on all designated HF MSI frequencies (see paragraphs 6.1 and 6.3).

### *Transitional arrangements*

3.8 There should be no difficult transitional problems with respect to the new Sea Area A3 definition. However, ship certificates will need to change. For Inmarsat users, nothing else changes. For future ship certificates for ships operating in A3, the ship's operational area will need to be compared with the provider's service area to determine if the ship will need to be equipped for Sea Area A4. A GMDSS satellite service provider declares its service area when it applies for recognition under resolution A.1001(25).

### *Obligations for shore authorities provision of services and implications for SAR*

3.9 Shore authorities are obligated to provide MSI in their NAVAREAs for the dissemination of Navigational warnings (resolution A.706(17), as amended), and in the METAREAs for the dissemination of meteorological forecasts and warnings to shipping (resolution A.1051(27)). Search and rescue services are provided in Search and Rescue Regions (SRRs) under the responsibility of the coastal States. The redefinition of Sea Area A3 does not affect either of these.



#### *Implications for the GMDSS Master Plan*

3.10 The GMDSS Master Plan (currently the GMDSS.1 circular) will need to be revised and possibly reorganized because it lists stations that operate in the various Sea Areas.

#### *Implications for amendments to Model Courses*

3.11 Mariner training will be affected and amendments to STCW including Model Courses may be required. Model Courses will, in general, need to be revised to reflect the new Sea Area A3 definition and its effect on Sea Area A4, together with other amendments to chapter IV. Mariner training will be affected and amendments to STCW may be required. Work on these matters should be referred to the HTW Sub-Committee.

#### *Implications for non-SOLAS vessels*

3.12 Non-SOLAS vessels are vessels that do not fall within the scope of SOLAS regulation IV/1. The redefinition of SOLAS Sea Area A3 should not affect vessels to which regulation IV/1 does not apply.

#### *Effects on ship's certificates*

3.13 Ship certificates will require definition of the geographical area in which the ship is permitted to operate with respect to Sea Areas A3 and A4. This can be accomplished by indicating the ship's GMDSS satellite service provider in brackets after the "A3", such as "A3 (Worldwidesat)".

3.14 Alternatively, a geographical presentation could be added to the "Record of Equipment" list in the certificates and considered under chapter I, regulations 12, 13 and 14, and matched with the satellite service provider's service area. This seems much more difficult than the option in paragraph 3.13 and is not recommended.

3.15 However, a ship with two different service providers, e.g. Inmarsat and a regional provider, would introduce some complexity. In that case, there would be a need to identify the intersection of the providers' operational areas.

3.16 Administrations, port State control authorities, and classification societies will need to be aware of the change to Sea Area A3/A4, and a suitable transition period needs to be identified for certificates.

#### *Satellite equipment carriage options*

3.17 As with Inmarsat, ships will need to carry satellite terminals approved to work with their selected service provider.

#### *Implications for the Modernization Plan*

3.18 SOLAS regulations, including as a minimum IV/2, IV/10 and IV/11, will need to be revised to reflect the revised Sea Areas A3 and A4.

3.19 Determine whether it is possible and feasible to retain the current requirement to be able to receive MSI using EGC (SOLAS regulation IV/7.1.5), taking into account the new definition of Sea Area A3 and the inclusion of new satellite providers in the GMDSS.

3.20 Depending on conclusions under paragraph 3.19, determine whether changes are required to the availability of HF-MSI in certain areas as a consequence of the new definition of Sea Area A3 and the inclusion of new satellite providers in the GMDSS.

3.21 Determine the feasibility of combined NAVTEX and NAVDAT receivers, able to receive on 490, 500 and 518 kHz and additionally on all designated HF MSI frequencies.

3.22 The GMDSS Master Plan (currently the GMDSS.1 circular) will need to be revised and possibly reorganized and will need to include the service areas for the GMDSS satellite service providers.

3.23 Model Courses will in general need to be revised to reflect the new Sea Area A3 definition and its effect on Sea Area A4, together with other amendments to chapter IV. The HTW Sub-Committee should consider these issues.

3.24 Administrations, port State control authorities, and classification societies need to be informed of the change to Sea Area A3/A4, and a suitable transition period needs to be identified for certificates.

#### **4 The role of MF/HF**

4.1 HF communications would remain the required communication system for Sea Area A4, providing a communication option for those ships that operate outside their satellite/A3 (e.g. regional) areas, or that do not subscribe to a satellite service covering their area of operation. MF DSC and radiotelephony at present are required in Sea Area A3, even when the ship has Inmarsat GMDSS satellite service. This provides a medium-range open channel ship-to-ship communications option for SAR on-scene operations. It is also important to maintain MF/HF communication systems, taking into account the need to have a back-up system in case satellite communication systems fail due to solar events. However, MF/HF communication systems may be also temporarily affected by these events.

4.2 From the GMDSS Master plan, it appears there are 95 HF DSC coast stations and 15 HF NBDP MSI coast stations. From others sources (French hydrography service SHOM), there are still 30 HF facsimile stations and 330 HF stations dedicated to general radio communication for radiotelephony, radiotelegraphy and data. These numbers are very difficult to verify either by IMO and ITU because the information is based on each Government's declaration. They include dormant or under-utilized stations. Also when looking on a world map of the distribution of HF stations, there is clearly a lack of participating HF stations in certain areas. There is no incentive for these stations to provide GMDSS-related communications as well as general radiocommunications because there is no possibility of generating sufficient income. An option for a commercially viable HF service is to combine military, commercial, maritime, land mobile services, etc., and some governmental entities are showing interest in the concept.

4.3 The HF coastal stations of China are operating and playing an important role in maritime safety. The Shanghai HF coast station operating DSC service receives and deals with large quantities of on-air testing from ships operating in the region of the northwest Pacific. The Guangzhou HF coast station operating on general communication channels, provides general and safety services for both merchant ships and large quantities of fishing boats operating in South China Sea. According to the statistical information, the general communication traffic taken by Guangzhou station for fishing boats reached 211,829 minutes in 2013, and 200,593 minutes in 2014. The station completed five cases of real distress communication from fishing boats on HF channels in 2013, and four cases in 2014.

### *Distribution of HF stations*

4.4 It appears, from information in the GMDSS Master plan, that HF DSC station distribution does not follow the basic principle for establishing HF DSC coast stations for sea area A3 and A4 as indicated in resolution A.801(19), annex 2, appendix 1. The majority of HF DSC coast stations are located in an area around the Equator. In some regions of the world there is a concentration of HF DSC coast stations and in some other regions, in particular in northern latitudes, there are few HF stations.

4.5 Then, if a majority of HF DSC coast stations are working on all HF bands (i.e. 4, 6, 8, 12 and 16 MHz), there are still some HF coast stations with no long-range HF communication capability in all HF bands. If we take into account the 330 HF coast stations dedicated to general radiocommunications, we may find some stations to be able to complete a global distribution of HF stations. Hence, the capability to have communication in all HF bands should be required. HF stations should also be fitted with adequate shore-based telecommunication infrastructure to relay a distress call to the appropriate SAR service.

4.6 It appears from this finding that the issue of the distribution of HF stations can only be dealt with at an international level with the help of the general methodology that has already been established in resolution A.801(19).

### *Distress communications*

4.7 To ensure an HF distress alert from a ship will be received ashore, some basic requirements are needed for the HF radio installation of the ship:

- .1 to transmit a distress alert on all HF bands, in order to be sure to reach an HF station at any time of the day and anywhere;
- .2 to have a proper aerial installation; and
- .3 to have a transmitting power at least equal to 250 Watt PEP.<sup>3</sup>

If these conditions are met, different HF coast stations would be able to receive a distress alert from a ship, with the stations receiving the distress alert on a different HF band. The routing of the distress alerts will lead the distress alert to the RCC in charge of the search and rescue region (SRR) where the ship in distress is located. This solution may provide redundant information to the RCC, but this is a simple solution. It relies on the importance of shore-based telecommunication to route the distress alert.

4.8 Selecting a reliable frequency for HF communications is greatly influenced by atmospheric conditions and therefore reliant on the experience of the operator to know what frequency is the best choice for successful HF communications. A solution may be based on an automatic roaming logging of the ship to the appropriate/closest HF coast station. This system would automatically adapt the HF logging to the position, but whatever the time, all HF frequency bands would be used to send a distress alert to the appropriate HF DSC coast station. This solution would reduce the number of HF stations to receive a distress alert, so there is a danger that the appropriate logged HF station is not operative at the time of the distress alert. Without a solution to secure reception (duplication of receiver for instance) the solution in paragraph 4.7 seems to be the simpler.

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<sup>3</sup> These radios are required to have a minimum power of 60 W PEP, but less than 400 W. 250 W seems to be the typical maximum power available for many existing radios.

4.9 Automated frequency scanning and Automatic Link Establishment (ALE) could be a solution to HF communication either on radiotelephony or radiotelegraphy or data transmission. ALE eliminates the need for operators to understand frequency selection based on varying propagation characteristics. Two stations would communicate on HF but without operators knowing on which frequency they are working. Consideration would have to be given to compatibility of DSC and ALE. Digital transmission would simplify the use of text messaging with the help of a dedicated computer.

#### *SAR communications*

4.10 Appendix 15 of the Radio Regulations lists frequencies that may be used for distress or safety purposes by mobile stations engaged in coordinated SAR operations (AERO SAR frequencies for instance: 3023 kHz, 4125 kHz, and 5680 kHz). Ship-to-aircraft communication is intended to be short-range, so lower frequencies in the spectrum using the ground wave are appropriate. Resolution 354 of the Radio Regulations, section 8 says, "Any aircraft required by national or international regulations to communicate for distress, urgency or safety purposes with stations of the maritime mobile service shall be capable of transmitting and receiving class J3E emissions when using the carrier frequency 2182 kHz or the carrier frequency 4125 kHz." These frequencies should be sufficient.

#### *MSI*

4.11 The HF NBDP MSI coast station and HF facsimile coast station infrastructure may be used for NAVDAT HF with the installation of suitable transmitter equipment. Further studies should be made to check the global coverage of this system based on present infrastructure taking into account the 330 HF stations used for general radio communications. NAVDAT is described in ITU-R Recommendation M.2058. The use of this technology would require coordination by IMO [see section 6 for the discussion on the possible use of NAVDAT and implications for the Modernization Plan].

#### *General communications*

4.12 There are enough HF coast stations for general communications. But the technology may change the use of HF on board ship in simplifying the operation of HF radio equipment. Frequency scanning/ALE could be a solution as explained above for distress communication, hence tele-medical assistance, radiotelephony, text and data services could be performed on HF smoothly and as a complementary system to satellite communication (HF systems would not have enough capacity for real-time video exchanges).

#### *Implications for the Modernization Plan*

4.13 For ensuring reliable global coverage of HF GMDSS in the long term, the technical basis for determining the minimum number of HF GMDSS coast stations and their geographical distribution should be reviewed and if necessary, consequential changes should be included in resolution A.801(19). The Radio Regulations have already been revised for HF data and 500 kHz is reserved for NAVDAT. Technological improvements can make HF easier to use.

4.14 Consider revising resolutions A.806(19) and MSC.68(68), annex 3, to include a requirement for frequency scanning and/or ALE.

## **5 HF DSC and NBDP in Sea Area A3**

5.1 The use of NBDP in distress messages for Sea Areas A3 and A4 is negligible. Australia and Denmark have commented that NBDP for follow-up communications has fallen into disuse. Reception of NAVTEX is widely accomplished today with systems other than NBDP that are able to store and display NAVTEX messages.

5.2 The original purpose of NBDP as follow-up communication was to overcome language difficulties in voice communications. Delegations have reported that NBDP has never been used for this purpose. It is even more unlikely today that any crew in distress would initiate a follow-up communication via NBDP, compared to direct voice communication.

5.3 Users rarely or never use NBDP at all and therefore would most likely have difficulties in using it in an emergency situation.

5.4 At the technical level, HF NBDP is more robust compared to voice communication. However, the difference has not been quantified in previous considerations of the possibility to phase out the NBDP carriage requirement, and the "real-life" benefit of having the possibility to "fall back" to NBDP seems unclear.

5.5 HF MSI is still needed in the modernized GMDSS, but can be accomplished by means other than NBDP. It is concluded that NBDP is not required to receive MSI and is not necessary to fulfil any of the other functional requirements.

5.6 ITU-R Recommendation M.1798-1 describes characteristics of HF radio equipment for the exchange of digital data and electronic mail in the maritime mobile service. This resource has not yet been put to use operationally and might be useful for ship-to-ship and ship-to-shore communication.

### *Implications for the Modernization Plan*

5.7 It can be concluded that NBDP can be removed as a carriage requirement for distress follow-up communications in Sea Areas A3 and A4. Existing devices can be permitted to remain in use to receive MSI, if a ship is not equipped with other equipment suitable for the purpose.

5.8 Consider the future role for HF data exchange under ITU-R Recommendation M.1798-1.

## **6 NAVDAT**

6.1 WRC-12 established an exclusive primary allocation to the maritime mobile service in the band 495-505 kHz to fulfil possible requirements in the future, replacing the former Morse Code calling and distress allocation. NAVDAT is a digital broadcasting system designed to operate in the 495-505 kHz band using a multicarrier frequency modulation technique. It would coexist with the global system NAVTEX without mutual interference. The technology allows improved data rates with regard to the frequency band: rates up to 18 kbit/s are possible with NAVDAT, to compare to the 50 bit/s of NAVTEX.<sup>4</sup>

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<sup>4</sup> See COMSAR 16/4/3 for a description of the digital system for broadcasting maritime safety and security-related information in the 500 kHz band (NAVDAT). Also: ITU-R Recommendation M.2010, characteristics of a digital system, named Navigational Data for broadcasting maritime safety and security related information from shore-to-ship in the 500 kHz band. ITU-R Recommendation M.2058-0,

6.2 Purchasing NAVDAT or combined NAVDAT/NAVTEX receivers would be a cost to shipowners, but the quantity and type of information available, including graphical data could prove beneficial. Shipowners would be able to continue to use existing NAVTEX-only receivers for many years. MSI providers would need to install or have access to the required shore infrastructure to provide NAVDAT service.

6.3 If widely adopted, NAVDAT could replace NAVTEX sometime in the future.

#### *Implications for the Modernization Plan*

6.4 SOLAS chapter IV should be revised to allow ships to use NAVDAT service in addition to or in place of NAVTEX in places where NAVDAT is available.

6.5 IMO and ITU should develop the necessary technical and operational recommendations and performance standards for international NAVDAT service. This work should be closely followed by the development of IEC standards for shipborne NAVDAT equipment.

6.6 The Modernization Plan should include development of NAVTEX/NAVDAT equipment standards for receiving all HF frequencies for MSI.

## **7 Shore-to-shore communications**

7.1 Shore-to-shore communications are not part of the GMDSS functional requirements, but are essential for the planning and coordination of search and rescue operations. In chapter I, it is clear that SOLAS is intended to apply to ships, even though obligations for Contracting Governments and Administrations may be stated or implied in some parts of SOLAS, as in regulations IV/5.1 and V/4 to V/13. Furthermore, shore-to-shore communications are not solely related to ship safety; they may be used in the case of aeronautical distress on or over ocean areas. However, the establishment of guidance for coastal radio stations (CRS) and the development of IEC standards would be useful.

7.2 SOLAS regulation V/7 includes obligations for Contracting Governments with respect to search and rescue services. A requirement could be added to regulation V/7 for the establishment of reliable shore-to-shore communications and a Maritime Rescue Co-ordination Centre (MRCC) or a Central Alerting Point (CAP) that is responsible for receiving distress alert information and responding as part of a SAR system. Regulation IV/5 (Undertakings by Contracting Governments) could be revised to ensure that it includes adequate responsibilities for governments to ensure adequate global distribution of coastal radio stations, adequate shore-based telecommunication infrastructure for SAR, and adequate staffing for shore-based facilities.

7.3 The establishment of requirements for the shore network is not included in the proposed modernization programme, noting that:

- .1 shore-to-shore communications are not included in the GMDSS functional requirements for ships and therefore could be considered outside the scope of GMDSS modernization;

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characteristics of a digital system named navigational data for broadcasting maritime safety and security related information from shore-to-ship in the maritime HF frequency band.

- .2 the present distribution of coastal radio stations participating in the GMDSS is inconsistent; and
- .3 the establishment of new responsibilities for Contracting Governments would probably be controversial and potentially expensive, resulting in delay in the GMDSS modernization effort.

*Implications for the Modernization Plan*

7.4 Guidance for CRS should be established through the development of IEC standards.

## **8 GMDSS equipment in SOLAS chapter III**

8.1 SOLAS requirements for two-way VHF radiotelephone apparatus and search and rescue locating devices (originally Search and Rescue Transponders (SART)) were part of the 1983 SOLAS Amendments and placed in chapter III, which came into force in 1986 in advance of the GMDSS. However, these requirements form part of the GMDSS because they address some of the functional requirements and would be more naturally located in chapter IV.

*Implications for the Modernization Plan*

8.2 Except for communications equipment installed or always stowed in survival craft, the communications requirements for ships and life-saving appliances in chapter III, should be moved to chapter IV.

8.3 The "Record of Equipment" list in the certificates for these items will need to be appropriately amended.

## **9 Emergency devices for survival craft**

9.1 The ICAO/IMO Joint Working Group on SAR (JWG) (IMO/ITU EG 10/4/5) expressed the view that PLBs should be considered to be carried as radio equipment for liferafts and/or carried on persons. These would be helpful by enabling RCCs to locate and track every survival craft because survival crafts may be drifting away from each other. However, the search and rescue locating devices required under current SOLAS regulation III/6.2.2 are intended for locating survival craft.<sup>5</sup> These devices can be either survival craft radar transponders (SART) operating with X-band radar, or AIS Search and Rescue Transmitters (AIS-SART).

9.2 PLBs are intended to be personal equipment and not for locating a survival craft. They are similar to Cospas-Sarsat EPIRBs, but are small and compact because they do not necessarily have to float, and have about half of the battery lifetime of an EPIRB. Like EPIRBs, they typically include a 121.5 MHz homing device. A PLB can be coded in several ways, e.g. like an EPIRB. However PLBs may not be connected to the ship via the MMSI or other coding, and the battery operational life is also a matter of concern.

9.3 The search and rescue experts subsequently agreed that radar SARTs and AIS-SARTs were appropriate locating devices for survival craft and that PLBs were not necessarily appropriate in this regard.

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<sup>5</sup> See also regulation IV/7.3.

9.4 Requirements for alerting and locating equipment are based on the concept that radio and/or EPIRBs will provide the alert and location of a vessel in distress. SARTs, pyrotechnic distress signals, highly visible colours for survival craft and flotation equipment, and locating lights are all intended to assist rescuers on-scene or close to the scene to locate survivors. 406 MHz equipment cannot be used for locating a survival craft by ships in the vicinity after a distress alert has been transmitted from the ship of origin. At present, the only shipborne system that could locate an EPIRB is a radio direction finder (not required) to detect a 121.5 MHz homing signal. If a survival craft on the open sea at night in harsh weather conditions would need assistance by the nearest ships in the area, their means of locating the survival craft could be limited to receiving position information from shore.

9.5 Radar SARTs have been provided on ships since 1986, but SAR cases do not record many instances where they were of use. There may be several reasons. One is that with the exception of one free-fall lifeboat (if the ship is so equipped), they are not carried on survival craft, but stowed in locations where they can be carried to survival craft. Only one or two are required to be carried on the ship, depending upon the size of the ship. As a result, it may be that they have not been put to use in many distress situations.

9.6 Radar SARTs should be able to be seen on X-band radars of ships responding to a distress, as well as maritime surveillance radars on SAR and military aircraft.

9.7 AIS-SART are relatively new devices, and are just beginning to be provided on ships, so their effectiveness has not yet been demonstrated in a SAR case, so far as is known. They are required in the same numbers as radar SARTs when they are used instead of radar SARTs. They should be visible on radar and other electronic chart screens such as ECDIS, equipped to display AIS targets. Likewise, they should be able to be seen on SAR and military aircraft equipped with AIS displays. In most cases, the range of detection of AIS-SARTs will be much greater than radar SARTs, especially from aircraft. However, older AIS receivers that have not been updated, will show AIS-SARTs as targets but will not display the "SART ACTIVE" text.

9.8 An advantage that an AIS-SART could have over the 121.5 MHz homer is that with the appropriate display on ships and aircraft, the position of the device will be shown. A direction finder for a 121.5 MHz signal will only indicate direction. Location will be indicated only when the indicated direction changes when an aircraft flies over the location. Furthermore, unless ships are equipped with 121.5 MHz direction finders (not required), they will not have any real-time information on the location of the survival craft. If the device is a PLB or something similar, the ship would have to rely on the position transmitted by or calculated from the 406 MHz signal relayed from Cospas-Sarsat. AIS-SARTs are more likely than 121.5 MHz homers to be detected by commercial as well as non-SOLAS ships. A new work item beginning in 2016 may result in a performance standard for EPIRBs that have both 121.5 MHz homing signals and AIS location.

9.9 A simple radio direction finder on certain ships would enable ships to locate distress or urgency radio transmissions in the VHF marine band and detect 121.5 MHz signals.

9.10 Location of survival craft might be improved by installing locating devices on survival craft, rather than just having a few stored on the ship to be carried to survival craft. This would not present a great problem for lifeboats, but might be more difficult for inflatable liferafts.



*Implications for the Modernization Plan*

9.11 Consider the development of a circular or other instrument to encourage Member Governments to adopt a requirement for certain categories of ships to carry VHF direction finders to detect 121.5 MHz signals and VHF marine band transmissions (for instance off shore industry vessels).

9.12 A decision needs to be made as to whether all lifeboats, and whether some or all inflatable liferafts should be equipped with installed locating devices. This would need to be coordinated with the SSE Sub-Committee and may be more appropriate as a requirement in chapter III of SOLAS, because this is where the lists of survival craft equipment are located.

## **10 Application of SOLAS chapter IV**

10.1 In discussions on the Detailed Review, some delegations were of the opinion that SOLAS chapter IV should be applicable to a wider group of ships, others preferred to maintain the current status, and to leave the application to non-SOLAS ships to national authorities. With some exceptions for regional solutions, the GMDSS forms the core of the distress and safety system for ships worldwide, which will apply to almost all ships regardless of the scope of SOLAS chapter IV. Contracting Governments have the ability to specify which components of the GMDSS apply to their non-SOLAS ships.

10.2 Although appropriate emergency devices are defined for SOLAS ships, most SAR operations are reported to involve more numerous non-SOLAS vessels. A lack of command of the English language and also illiteracy may cause problems for these vessels. Nevertheless, ITU has only one system as laid down in the Radio Regulations, which is applicable to all vessels. Furthermore, non-SOLAS vessels may serve as rescue resources. The radar SART/AIS-SART devices are more likely to be detected by these vessels than 121.5 MHz homers.

*Implications for the Modernization Plan*

10.3 It is not practical to extend the scope of application of SOLAS chapter IV to ships beneath 300 gross tonnage. However, it is recognized that the integration and participation of non-SOLAS vessels in the Modernized GMDSS remains important. Decisions on and changes in the Modernized GMDSS should therefore be made in a way that non-SOLAS vessels are not excluded from participating in the Modernized GMDSS. There are no direct implications for the Modernization Plan. However, it must be ensured that new and revised IMO and ITU instruments do not exclude non-SOLAS vessels from participating in the GMDSS for technical or economic reasons, and that such instruments as affect non-SOLAS vessels are compatible with the GMDSS. Since the application of GMDSS to fishing vessels has been stipulated in the Cape Town Agreement, consideration may be given in the future to revise the Cape Town Agreement for consistency with the Modernized GMDSS.

## **11 Standards for MOB devices to protect GMDSS integrity**

11.1 Concern was expressed about Man Overboard (MOB) Devices, in particular that they may use GMDSS distress frequencies for situations which are not actually distresses and that regulations may be necessary to protect the integrity of the GMDSS.

11.2 ITU-R Report M.2285-0 provides an overview of MOB devices and their mode of operation. However, as a report it only reviews current (presumably acceptable) practices. Recent revisions to ITU-R Recommendation M.493 and ITU-R Recommendation M.541 establish an equipment class and operational standards for DSC MOB devices. The revised recommendations establish a more well-defined set of requirements for the technical performance and operational procedures for these devices.

11.3 The existence and use of MOB devices may have significant implications for users of the GMDSS. For instance, a SOLAS vessel receiving a signal from such a device will be obliged to report and investigate the situation with all the economic and other consequences that may have. In particular, devices making use of GMDSS frequencies and technology are of concern in this respect.

11.4 In addition to MOB devices, "alternative" uses of GMDSS frequencies and technology are already seen in the operational environment, e.g. use of AIS for all sorts of tracking purposes. All possible measures should be taken to avoid such non-safety uses of the system.

#### *Implications for the Modernization Plan*

11.5 Because new revisions of ITU-R Recommendations M.493 and M.541 have been published by ITU and because MOB devices are not a required part of the GMDSS under SOLAS, there appears to be no direct implication as part of the Modernization Plan.

11.6 Because MOB devices and other equipment existing or to be developed may have significant implications for all parties to the GMDSS, it is important that the Modernized GMDSS is protected from abusing use of its frequencies and technologies. Measures to protect the integrity of the Modernized GMDSS should be investigated and implemented. One measure for consideration will be the agenda item for WRC-19 which is to consider regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and AIS. Another consideration could be a liaison statement to ITU-R indicating that because non-SOLAS ships make use of GMDSS, and that in order to protect the integrity of GMDSS, it is necessary that ITU-R recommendations on GMDSS systems and frequency use are prescriptive.

## **12 Reducing false alerts**

12.1 Unintentional false alerts have been a concern in the GMDSS. These false alerts waste time and money for responders, so anything that can be reasonably done to reduce them would be beneficial. One source of false alerts has been significantly reduced and those are DSC automatic distress alert relays on MF and HF frequencies.

12.2 EPIRBs can be a source of false alerts. They are also designed to activate automatically when launched, and several things can happen which can cause them to begin transmitting unintentionally. This can happen without the ship's crew being aware of the problem because 406 MHz and 121.5 MHz EPIRB transmissions are not normally received on the ship.

12.3 Japan provided some statistics on false alerts. This data is for all ships including foreign-flag ships in the Japanese Search and Rescue Regions (SRR) in 2014:

	Number of alerts	Number of false alerts	Percentage of false alerts
EPIRB	503	484	96.2%
ELT	132	129	97.7%
PLB	10	10	100%

A survey found that most false alerts were the result of human error, and that mariner education is important. Failure to remove the battery when disposing of the beacon was another cause of false alerts. False alerts as a result of beacon failure rarely occurred.

12.4 The United States Sarsat Office looked at the percentage of false alerts as a function of the beacon population by type:

False alerts as a percentage of beacon population		Percentage of total beacons registered
EPIRB	0.91 %	47%
ELT	4.33 %	18%
PLB	0.38 %	35%
SSAS	4.69 %	-
Overall	1.25 %	

**Note:** SSAS is not part of the GMDSS

By this analysis, EPIRBs and PLBs are much less of a problem than aircraft Emergency Locator Transmitters (ELT). The number of SSAS beacons is small, and that result may not be significant. One way to view the EPIRB result is that an individual EPIRB can be expected to transmit a false alert once every 110 years.

12.5 One proposal was to provide an audible signal when the EPIRB begins to transmit.

12.6 Another proposal was to require a system that would include a 406 MHz receiver on the bridge. This would require a significant expenditure throughout the SOLAS fleet and was not thought to be cost-effective. The Maritime Safety Committee has declined to include the consideration of a related proposal in the biennial agenda of the NCSR Sub-Committee (MSC 95/22, paragraph 19.10).

12.7 It was noted that, although not currently part of the GMDSS modernization proposal, the suggestion for a simple radio direction finder on certain SOLAS ships would enable ships to locate distress or urgency radio transmissions in the marine band and detect 121.5 MHz signals (see paragraph 9.9). This would also allow for monitoring of ship's EPIRBs to detect unintentional activations. In this regard, the suggestion was supported to invite IMO to encourage its Member Governments to consider such a requirement for certain categories of ships (for instance offshore industry vessels).

#### *Implications for the Modernization Plan*

12.8 No specific action has been identified to reduce false alerts. Manufacturers should be made aware of the problem, perhaps through a circular recommending that they seek to reduce the susceptibility of their equipment to generating false alerts (note resolution A.814(19) on *Guidelines for the avoidance of false distress alerts*). It should also encourage reduction of

false alerts caused by human error. Proper disposal should be emphasized, including removal of the battery. Measures should be taken to guide/educate people on how to handle EPIRBs in order to avoid misactivation, including seafarers, operators, shipyards (both for building and recycling), inspectors and surveyors.

### **13 Coordination with the work on the implementation of the e-navigation Strategy Implementation Plan**

13.1 The GMDSS and other communication technologies are at the core of the e-navigation strategy, providing ship-to-shore and shore-to-ship exchange of data. AIS and ECDIS are the newest technologies included in SOLAS. AIS uses VHF maritime frequencies and ECDIS can indicate the position of the AIS signal on an electronic chart display. GMDSS satellite service providers will provide much of the communication capacity for e-navigation. VHF Data Exchange System (VDES) is another e-navigation technology in development that uses the VHF maritime frequencies. Furthermore, Digital Radio Mondial (DRM) has developed new capacity with digital transmission such as NAVDAT on MF.

13.2 Various e-navigation aspects considered included:

- .1 e-navigation gap analysis;
- .2 the need to integrate navigation systems and communication systems;
- .3 the need to read MSI in graphical display;
- .4 functionalities for shore-to-shore communications;
- .5 common shore-based system architecture (CSSA) for communications;
- .6 usability of equipment;
- .7 software quality assurance of equipment;
- .8 man-machine interface; and
- .9 the scalability to all types of vessels.

13.3 The GMDSS modernization project could be a framework to develop e-navigation communication by primarily securing in SOLAS the fundamental principles of communication for safeguarding human life at sea by the Contracting Governments.

13.4 The GMDSS modernization project could offer a possible common shore-based system architecture (CSSA) for communication by sharing for instance a Coastal Radio Station for different users: Rescue Co-ordination Centre (RCC), Maritime Assistance Service (MAS), Vessel Traffic Service (VTS), Maritime Safety Information (MSI) provider, Public Correspondence (PC).

#### *Implications for the Modernization Plan*

13.5 The GMDSS modernization project should support the e-navigation Strategy of IMO (MSC 85/26/Add 1, Annex 20).

## **14 Role of VDES**

14.1 The VHF Data Exchange System (VDES) was developed by IALA to address emerging indications of overload of the AIS VHF Data Link (VDL) and simultaneously enabling a wider seamless data exchange for the maritime community. VDES is capable of exchanging Application Specific Messages (ASM), facilitating numerous applications for safety and security of navigation, protection of marine environment, efficiency of shipping and others. VDES will prospectively have a significant beneficial impact on the maritime information services including Aids to Navigation and VTS in the future. It can potentially provide local MSI.

14.2 The VDES concept includes a satellite component. This system component might be suitable to be used for the transmission of MSI information in remote areas.

14.3 The VDES concept is being developed under of Agenda Item 1.9 for WRC-19.

### *Implications for the Modernization Plan*

14.4 The use of VDES needs to be considered in future possible mechanisms for the distribution of MSI.

## **15 Role of text messages, digital data, and/or distress chat via satellite**

15.1 Text messages and chat technologies are means of two-way communication, like voice and NBDP. Resolution A.1001(25) already addresses data communication systems. Under resolution A.1001(25), voice communication systems connect to the PSTN, and data communication systems connect to the public data communication network. Text messages and chat are data communication systems, so there may be no reason why they cannot be used for GMDSS communications. Safety-related messaging is also available through the AIS system.

### *Implications for the Modernization Plan*

15.2 Consideration should be given to the possible SAR benefits of the inclusion of text messaging, digital data, and chat messaging capabilities.

15.3 Resolution A.1001(25) may need to be reviewed to investigate whether text messages, digital data, and chat can be included in GMDSS communications.

## **16 Other revisions to SOLAS chapter IV**

16.1 SOLAS chapter IV includes several provisions that are obsolete or otherwise in need of revision:

- .1 As decided under the High-level Review, "Security communications" and "Other communications" should be added to the functional requirements in addition to the GMDSS functions.
- .2 There are obsolete references to the International Radio Consultative Committee (CCIR).
- .3 Some terms and definitions are not consistent with the Radio Regulations and other ITU-R documents.
- .4 Regulation IV/6.2.5 refers to unspecified "other codes" to be clearly marked on the radio installation.

- .5 VHF EPIRBs have never been introduced.
- .6 Certain regulations, such as IV/9.1.2, should be simplified because separate DSC watch receivers are not common and modern equipment practice integrates the radio functions into a single installation.
- .7 Regulation IV/12.3 needs to be revised to reflect the decision to retain the VHF Channel 16 watch. A continuous listening watch is also needed in some areas for VTS, Maritime Assistance Service, coastal surveillance, ship reporting, port approaches, etc.
- .8 Regulation IV/18 exempts communication equipment from automatically receiving the ship's position if the ship is not provided with a navigation receiver. Such receivers are now required on all ships under regulation V/19.2.1.6.

*Implications for the Modernization Plan*

16.2 Definitions are needed for "Security communications" and "Other communications", as well as requirements for radio installations to perform these functions.

16.3 In accordance with the decisions of the High-level Review, "Security communications" and "Other communications" need to be added to the functional requirements in chapter IV.

16.4 References to the International Radio Consultative Committee (CCIR) should be changed to the International Telecommunications Union (ITU-R).

16.5 Terms and definitions should be harmonized with the Radio Regulations and other ITU-R documents.

16.6 Regulation IV/6.2.5 should be revised to clarify the "other codes" required to be clearly marked on the radio installation.

16.7 The VHF EPIRB should be removed from SOLAS chapter IV.

16.8 Revise and simplify regulations, such as IV/9.1.2, to reflect that separate DSC watch receivers are no longer common and modern equipment practice integrates the radio functions into a single installation.

16.9 Revise regulation IV/12.3 to reflect the decision to retain the VHF Channel 16 watch, as well as continuous listening watches; also in some areas for general communications including VTS, Maritime Assistance Service, coastal surveillance, ship reporting, port approaches, etc.

16.10 Remove the regulation IV/18 exemption for communication equipment from automatically receiving the ship's position if the ship is not provided with a navigation receiver.

16.11 Review chapter IV for editorial improvements.

16.12 Review and revise IMO resolutions consequential to the decisions made for GMDSS modernization.

## 17 Outline of the Modernization Plan

### *Revisions to SOLAS chapter III*

17.1 Except for communications equipment installed or always carried in survival craft, the communications requirements for ships and life-saving appliances in chapter III, should be moved to chapter IV (see paragraph 8.2).

17.2 A decision needs to be made as to whether all lifeboats, and whether some or all inflatable liferafts, should be equipped with installed locating devices, and that requirement located in chapter III with other survival craft equipment (see paragraph 9.12).

17.3 The "Record of Equipment" list in the certificates for these items will need to be appropriately amended (see paragraph 8.3).

### *Revisions to SOLAS chapter IV*

17.4 The GMDSS modernization process should ensure that non-SOLAS vessels are not excluded from participating in the GMDSS for technical or economic reasons, and such instruments as affect non-SOLAS vessels should be compatible with the GMDSS (see paragraph 10.3).

17.5 The GMDSS modernization project needs to continue to support the needs of the e-navigation strategy (see paragraph 13.5).

17.6 SOLAS chapter IV should be revised to provide for other GMDSS satellite service providers in addition to Inmarsat (see paragraph 3.18).

17.7 NBDP can be removed as a required system, although existing devices can be permitted to remain in use to receive MSI, if a ship is not equipped with other equipment suitable for the purpose (see paragraph 5.7).

17.8 SOLAS chapter IV should be revised to allow NAVDAT service to be used in place of NAVTEX in places where NAVDAT is available (see paragraph 6.4).

17.9 Ship certificates will require definition of the geographical area in which the ship is permitted to sail with respect to Sea Areas A3 and A4. This can be accomplished by indicating the ship's GMDSS satellite service provider in brackets after the "A3", such as "A3 (Worldwidesat)" (see paragraph 3.13).

17.10 SOLAS regulations, including as a minimum IV/2, IV/10 and IV/11, will need to be revised to reflect the revised Sea Areas A3 and A4 (see paragraph 3.18).

17.11 Definitions are also needed for "Security communications" and "Other communications", as well as requirements for radio installations to perform these functions (see paragraph 16.2).

17.12 References to the International Radio Consultative Committee (CCIR) should be changed to the International Telecommunications Union (ITU-R) (see paragraph 16.4).

17.13 Terms and definitions should be harmonized with the Radio Regulations and other ITU-R documents (see paragraph 16.5).

17.14 "Security communications" and "Other communications" should be added to the functional requirements in addition to the GMDSS functions (see paragraph 16.3).

17.15 Regulation IV/6.2.5 should be revised to clarify the "other codes" required to be clearly marked on the radio installation (see paragraph 16.6).

17.16 The VHF EPIRB should be removed from SOLAS chapter IV (see paragraph 16.7).

17.17 Revise and simplify regulations, such as IV/9.1.2, to reflect that separate DSC watch receivers are no longer common and modern equipment practice integrates the radio functions into a single installation (see paragraph 16.8).

17.18 Revise regulation IV/12.3 to reflect the decision to retain the VHF Channel 16 watch, as well as continuous listening watches is also in some areas for general communications including VTS, Maritime Assistance Service, coastal surveillance, ship reporting, port approaches, etc. (see paragraph 16.9).

17.19 Remove the regulation IV/18 exemption for communication equipment from automatically receiving the ship's position if the ship is not provided with a navigation receiver (see paragraph 16.10).

17.20 Review chapter IV for editorial improvements (see paragraph 16.11).

#### *Other IMO Instruments*

17.21 Refer to annex 1 of this report.

17.22 No specific action has been identified to reduce false alerts. Manufacturers should be made aware of the problem, perhaps through a circular recommending that they seek to reduce the susceptibility of their equipment to generating false alerts. Note resolution A.814(19) on *Guidelines for the avoidance of false distress alerts*. It should also encourage reduction of false alerts caused by human error. Proper disposal should be emphasized, including removal of the battery. Measures should be taken to guide/educate people on how to handle EPIRBs in order to avoid misactivation, including seafarers, operators, shipyards (both for building and recycling), inspectors and surveyors (see paragraph 12.8).

17.23 IMO and ITU should develop the necessary technical recommendations and performance standards for international NAVDAT service. This work should be closely followed by the development of IMO and IEC standards for shipborne NAVDAT and/or combined NAVTEX/NAVDAT equipment (see paragraphs 5.7 and 6.4).

17.24 Consider the development of a circular or other instrument to encourage Member Governments to adopt a requirement for certain categories of ships to carry VHF direction finders to detect 121.5 MHz signals and VHF marine band transmissions (for instance off shore industry vessels) (see paragraph 9.11).

17.25 Consideration should be given to the possible SAR benefits of the inclusion of text messaging, digital data, and chat messaging capabilities (see paragraph 15.2).

17.26 Mariner training will be affected and amendments to STCW including Model Courses may be required. Model Courses will in general need to be revised to reflect the new Sea Area A3 definition and its effect on Sea Area A4, together with other amendments to chapter IV. Mariner training will be affected and amendments to STCW may be required (see paragraphs 3.11 and 3.23).

17.27 New and revised IMO instruments should not exclude non-SOLAS vessels from participating in the GMDSS for technical or economic reasons, and such instruments as affect non-SOLAS vessels should be compatible with the GMDSS (see paragraph 10.3).



17.28 The technical basis for determining the minimum number of HF GMDSS coast stations and their geographical distribution should be reviewed and, if necessary, consequential changes should be included in resolution A.801(19) (see paragraphs 4.13 and also 17.34 regarding guidance for CRS).

#### *ITU Reports and Resolutions*

17.29 IMO and ITU should develop the necessary technical and operational recommendations and performance standards for international NAVDAT service (see paragraph 6.5).

17.30 Consideration should be given to a liaison statement to ITU-R indicating that it is desirable that non-SOLAS ships make use of the GMDSS, and that in order to protect the integrity of the GMDSS, it is necessary that ITU-R recommendations on GMDSS systems and frequency use are prescriptive (see paragraph 11.6).

17.31 New and revised ITU instruments should not exclude non-SOLAS vessels from participating in the GMDSS for technical or economic reasons, and such instruments as affect non-SOLAS vessels should be compatible with the GMDSS (see paragraph 10.3).

17.32 Consider the future role for HF data exchange under ITU-R Recommendation 1798 1 (see paragraph 5.8).

#### *IEC Standards*

17.33 Completion of IMO and ITU technical and operational recommendations and performance standards for international NAVDAT service, should be followed by the development of IEC standards for shipborne NAVDAT equipment (see paragraph 6.5).

17.34 Guidance for coastal radio stations (CRS) should be established through the development of IEC standards (see paragraph 7.4).

#### *Provision of GMDSS satellite services*

17.35 Formatting of EGC should be standardized if possible to minimize delays, and if possible, a way should be found to transmit EGC simultaneously on all GMDSS satellite service providers (see paragraph 2.19).

#### *MSI providers*

17.36 Possible ways for MSI providers to provide and monitor MSI broadcasts over multiple GMDSS satellite service providers should be identified with a view to minimizing the costs, or at least the cost increases for MSI providers. Resolution A.707(17) could be revised to provide for shore-to-ship MSI broadcasts without charge to the originator (see paragraph 2.18).

17.37 Determine whether it is possible and feasible to retain the current requirement to be able to receive MSI using EGC (SOLAS regulation IV/7.1.5), taking into account the new definition of Sea Area A3 and the inclusion of new satellite providers in the GMDSS (see paragraph 3.19).

17.38 Depending on conclusions under paragraph 17.37, determine whether changes are required to the availability of HF-MSI in certain areas as a consequence of the new definition of Sea Area A3 and the inclusion of new satellite providers in the GMDSS (see paragraph 3.20).

17.39 The use of VDES needs to be considered in future possible mechanisms for the distribution of MSI (see paragraph 14.4).

*HF communications*

17.40 Technological improvements can make HF easier to use. Consider revising resolutions A.806(19) and MSC.68(68), annex 3, to include a requirement for frequency scanning and/or ALE (see paragraphs 4.13 and 4.14).

*Transitional provisions*

17.41 Administrations, port State control authorities, and classification societies need to be informed of the change to Sea Area A3/A4, and a suitable transition period needs to be identified for certificates (see paragraph 3.24).

**18 Elements considered during the Detailed Review and their disposition**

18.1 During discussions on the Detailed Review of the GMDSS, a number of possible changes were considered. Annex 2 identifies the subjects that were considered and determined not to be included in GMDSS modernization.

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## ANNEX 2

### PROPOSAL FOR A NEW OUTPUT: REVISION OF SOLAS CHAPTERS III AND IV FOR MODERNIZATION OF THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS), INCLUDING RELATED AND CONSEQUENTIAL AMENDMENTS TO OTHER EXISTING INSTRUMENTS

#### Introduction

1 This document, submitted in accordance with paragraphs 4.1, 4.6 and 5.9, and annex 1 of MSC-MEPC.1/Circ.5, MSC-MEPC.7/Circ.1 and MSC.1/Circ.1500, proposes a new output for the inclusion in the High-level Action Plan of the Organization on the Revision of SOLAS chapters III and IV, as well as necessary related and consequential amendments to other existing instruments in order to implement the Global Maritime Distress and Safety System (GMDSS) Modernization Plan (NCSR 4/29, Annex [...]).

#### IMO objectives

2 The proposed output will enable the use of modern communication systems in the GMDSS, while removing the requirement to carry obsolete systems such as Narrow Band Direct Printing (NBDP) if the ship does not use them to meet the functional requirements of the GMDSS.

3 While it is not envisaged to establish new carriage requirements for ships,<sup>6</sup> the revised GMDSS which is planned to enter into force in 2024, will provide for the introduction of new services and systems, such as NAVDAT, and for enhanced and more reliable Search and Rescue capabilities by, for example, including the Cospas-Sarsat MEOSAR system.

4 The proposal directly supports IMO High Level Actions 5.1.3 to enhance safety of navigation, 5.2.1 for technical and operational safety aspects of all types of ships, 5.2.5 to monitor and evaluate the operation of the GMDSS and 5.2.6 as it is intended to support the e-navigation strategy (resolution A.1098(29)).

#### Compelling need

5 The Global Maritime Distress and Safety System (GMDSS) was adopted as part of the 1988 Amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS). It was fully implemented in 1999, and it has served the seafarer and the maritime industry well since its inception, but some of the GMDSS technologies used have not reached their full potential, and after more than 30 years since their development, some GMDSS functions could be performed by more modern technologies.

6 The compelling need for modernization of the GMDSS also derives from the need to harmonize the IMO provisions with the ITU's Radio Regulations and the deletion of references to obsolete communication systems such as the VHF EPIRB which has never been implemented. The review of the GMDSS also needs to incorporate correct references to present Cospas-Sarsat systems, a modified definition of Sea Area A3 (if not already done under the existing output 5.2.5.8), provide for optional use of NAVDAT, removal of the requirement to carry equipment for direct-printing telegraphy, reflect the correct VHF Channel 16 continuous listening watch requirements, and consideration of the need for more search and rescue locating devices on survival craft. Further editorial revisions should include updating references in IMO instruments, for instance changing CCIR to ITU-R, replacing any

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<sup>6</sup> Only new SAR carriage requirements for lifeboats and life-rafts are considered

references to Inmarsat by the generic reference "recognized mobile-satellite service", revision of any wording that suggests that a GMDSS work station is required separate from the ship's main radio installation, and updating footnotes to reference current IMO instruments.

7 The resolutions and circulars requiring revision are listed at appendix 1, along with a brief description of the changes needed.

### **Analysis of the issue**

8 Some provisions of chapter IV of SOLAS are out of date. With the possible exception of the addition of more search and rescue locating devices on survival craft, no new carriage requirements will be introduced, and some existing equipment requirements will be removed. New ships will be able to fit modern equipment and will not need to carry obsolete systems, while existing ships will be able to continue using their existing communication systems.

### **Analysis of implications**

9 The additional administrative requirements or burdens to the Organization or to the shipping industry will be minimal as a result of the proposed revisions as set out in the Modernization Plan of the GMDSS. If an additional carriage requirement for ships would be adopted, for example requiring additional search and rescue locating devices on survival craft, the cost to the shipping industry is expected to be manageable. In addition, search and rescue services will benefit from better location information from survival craft, resulting in a higher safety standard and reduced costs to Administrations that provide search and rescue services.

10 The administrative checklist, MSC-MEPC.1/Circ.5, annex 5, is attached to this document as appendix 2.

### **Benefits**

11 The adoption of amendments to SOLAS chapters III and IV will improve ship safety and facilitate distress, urgency, safety and routine ship-to-ship and ship-to-shore communications. The revision of the GMDSS through SOLAS amendments will enhance, in particular, search and rescue at sea and provide for harmonization with related instruments of other regulating bodies, such as ITU. With the deletion of obsolete provisions, particularly in chapter IV of the SOLAS Convention, ship owners, marine administrations and the IMO will be relieved of maintaining and supervising systems and processes which are not, or no longer, being used in the GMDSS.

### **Industry standards**

12 In close cooperation with the International Electrotechnical Commission (IEC), the IEC standards that now support equipment under SOLAS chapter IV will be amended or withdrawn, if such equipment is no longer required under SOLAS. IEC will need to continue to maintain testing standards for GMDSS equipment as technology advances.

### **Output**

13 The output will be revised chapters III and IV:

- .1 Specific: Amendments to SOLAS chapters III and IV, as well as necessary related and consequential amendments to other existing instruments in order to implement the Global Maritime Distress and Safety System (GMDSS) Modernization Plan;

- .2 Measureable: Completed, approved and adopted instruments;
- .3 Achievable: MSC's subsidiary bodies have the expertise required;
- .4 Realistic: Ample time is proposed to complete the work; and
- .5 Time-Bound: The work is expected to take four years (two biennia) to complete – 2018-2019 and 2020-2021. Amendments would be approved by MSC in 2021, adopted by MSC in 2022 for entry into force in 2024.

### **Human element**

14 This proposal is consistent with the goals of the Organization and is based upon the vision and principles described in resolution A.947(23). The expected change to training requirements for seafarers are expected to be minimal but should be reflected in the applicable revised IMO model courses. The completed human element checklist from MSC-MEPC.7/Circ.1 is attached to this document as appendix 3.

### **Urgency and target completion year**

15 With direct relevance to the objective of enhancing technical, operational and safety management standards, and noting the Modernization Plan of the GMDSS, it is believed that this work is of paramount importance.

16 The work is expected to take four years (two biennia) to complete, from 2018 to 2019 and from 2020 to 2021. Amendments are expected to be approved by the MSC in 2021, adopted in 2022, for entry into force in 2024. A Plan of Work is provided in annex 1 of the Modernization Plan.

17 This initiative should be considered by the Organization as soon as possible and be included in the High-level Action Plan of the Organization and priorities for the 2018-2019 biennium. The NCSR Sub-Committee with the support of the HTW and SSE Sub-Committees, as required, is expected to need four sessions to complete its work starting from NCSR 5 in 2018.

### **Action requested of the Committee**

18 The Committee is invited to include a new output on "Revision of SOLAS chapters III and IV for Modernization of the Global Maritime Distress and Safety System (GMDSS), including related and consequential amendments to other existing instruments" in the 2018-2019 biennial agenda of the NCSR, HTW and SSE Sub-Committees and the provisional agenda for HTW 5, NCSR 5 and SSE 5, with a target completion year of 2021.

## APPENDIX 1

### LIST OF IMO INSTRUMENTS TO BE REVISED

Resolution A.806(19) as amended by MSC.68(68) annex 3	Performance standards for shipborne MF/HF radio installations capable of voice communications and digital selective calling	<ul style="list-style-type: none"> <li>• May need to be revised with respect to decisions on NBDP</li> <li>• Consider requirement for Automatic Link Establishment (ALE)</li> </ul>
Resolution A.805(19)	Performance standards for float-free VHF emergency position-indicating radio beacons	<ul style="list-style-type: none"> <li>• To be revoked</li> </ul>
Resolution A.801(19) as amended by MSC.199(80)	Provision of radio services for the global maritime distress and safety system (GMDSS)	<ul style="list-style-type: none"> <li>• Will need to be revised in respect of new satellite providers and A3 and A4 Sea Areas</li> </ul>
Resolution A.707(17)	Charges for Distress, Urgency and Safety Messages through the Inmarsat System	<ul style="list-style-type: none"> <li>• Revise for additional satellite service providers</li> <li>• Consider provision of shore-to-ship MSI broadcasts without charge to the originator</li> </ul>
Resolution A.702(17)	Radio maintenance guidelines for the global maritime distress and safety system (GMDSS) related to sea areas A3 and A4	<ul style="list-style-type: none"> <li>• References to Sea Areas and Inmarsat need to be revised</li> </ul>
Resolution MSC.306(87)	Revised performance standards for Enhanced Group Call (EGC) equipment	<ul style="list-style-type: none"> <li>• Make provision for any additional satellite service providers, if necessary</li> </ul>
Resolution MSC.131(75)	Maintenance of a continuous listening watch on VHF channel 16 by SOLAS ships whilst at sea and installation of VHF DSC facilities on non-SOLAS ships	<ul style="list-style-type: none"> <li>• Revoke or revise. (Note that the resolution encourages use of VHF DSC and does not reflect decision on continued channel 16 watch. A new instrument may be needed to contain the elements that are still relevant and of importance)</li> </ul>
Resolution MSC.68(68), annex 3	Performance Standards for MF/HF Radio Installations Capable Of Voice Communication, Narrow Band Direct Printing And Digital Selective Calling	<ul style="list-style-type: none"> <li>• Consider requirement for frequency scanning and/or Automatic Link Establishment (ALE)</li> </ul>

MSC.1/Circ.1460	Guidance on the Validity of Radiocommunications Equipment Installed and Used on Ships	<ul style="list-style-type: none"> <li>Remove reference to HF radiocommunication equipment capable of operating NBDP</li> </ul>
MSC/Circ.1040/Rev.1	Guidelines on annual testing of 406 MHz satellite EPIRBs	<ul style="list-style-type: none"> <li>Ensure Guidelines are relevant for Second Generation Beacons</li> <li>Provide for EPIRBs with AIS locators</li> </ul>
MSC/Circ.1039	Guidelines for shore-based maintenance of satellite EPIRBs	<ul style="list-style-type: none"> <li>Revise to include AIS locators</li> <li>Delete L-band EPIRB</li> <li>Review for needed changes in respect of Second Generation Beacons</li> </ul>
MSC/Circ.1038	Guidelines for general radiocommunications	<ul style="list-style-type: none"> <li>Requires revision with respect to "general communications"</li> </ul>
MSC/Circ.803	Participation of non-SOLAS ships in the GMDSS	<ul style="list-style-type: none"> <li>Should be reviewed and generally updated (reference to 2182 kHz alarm signal which has been removed in COLREG by Res. A.1004(25)/Rev.1)</li> </ul>
COMSAR.1/Circ.50/Rev.3	Distress priority communications for RCC from shore-to-ship via Inmarsat	<ul style="list-style-type: none"> <li>Consider whether similar circular is needed for additional satellite providers</li> </ul>
COMSAR/Circ.37	Guidance on minimum communication needs of Maritime Rescue Co-ordination Centres (MRCCs)	<ul style="list-style-type: none"> <li>Make provision for any additional satellite service providers and revise any Inmarsat-specific terms such as SafetyNET.</li> <li>Review section on Telex link – is it used?</li> </ul>
COMSAR/Circ.32	Harmonization of GMDSS requirements for radio installations on board SOLAS ships	<ul style="list-style-type: none"> <li>Some terms need revision, i.e. "radar transponder"; "A3" and "A4" will have different meanings</li> <li>Update channel 16 watch requirements</li> <li>Is description of radio work station consistent with current bridge design?</li> <li>Make provision for any additional satellite service providers</li> </ul>
COMSAR/Circ.17	Recommendation on use of GMDSS equipment for non-safety communications	<ul style="list-style-type: none"> <li>Consider including in a revision of MSC/Circ.1038</li> </ul>

COM/Circ.117	Clarifications of the application of certain provisions of chapter IV of the SOLAS Convention	<ul style="list-style-type: none"><li>• Should be able to be revoked after adoption of revised chapter IV</li></ul>
COM/Circ.110 + Corr.1	Clarifications of SOLAS regulations IV/6.1, IV/6.2.2 and IV/10.1.1.3	<ul style="list-style-type: none"><li>• Should be able to be revoked after adoption of revised chapter IV</li></ul>
COM/Circ.105 + Corr.1	Clarification of certain provisions of the 1998 SOLAS amendments for the GMDSS	<ul style="list-style-type: none"><li>• Should be able to be revoked after adoption of revised chapter IV</li></ul>



**APPENDIX 2**

**CHECKLIST FOR IDENTIFYING ADMINISTRATIVE REQUIREMENTS AND BURDENS**

This checklist should be used when preparing the analysis of implications required for submissions of proposals for inclusion of unplanned outputs. For the purpose of this analysis, the terms "administrative requirements" and "burdens" are as defined in resolution A.1043(27) on *Periodic review of administrative requirements in mandatory IMO instruments*, i.e. administrative requirements are an obligation arising from future IMO mandatory instruments to provide or retain information or data, and administrative burdens are those administrative requirements that are or have become unnecessary, disproportionate or even obsolete.

**Instructions:**

(A) If the answer to any of the questions below is YES, the Member State proposing an unplanned output should provide supporting details on whether the burdens are likely to involve start-up and/or ongoing cost. The Member State should also give a brief description of the requirement and if possible, provide recommendations for further work (e.g. would it be possible to combine the activity with an existing requirement?).

(B) If the proposal for the unplanned output does not contain such an activity, answer NR (Not required).

1. Notification and reporting? Reporting certain events before or after the event has taken place, e.g. notification of voyage, statistical reporting for IMO Members, etc.	NR	<del>Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing</del>
Description: (if the answer is yes)		
2. Record keeping? Keeping statutory documents up to date, e.g. records of accidents, records of cargo, records of inspections, records of education, etc.	NR	<del>Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing</del>
Description: (if the answer is yes)		
3. Publication and documentation? Producing documents for third parties, e.g. warning signs, registration displays, publication of results of testing, etc.	NR	<del>Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing</del>
Description: (if the answer is yes)		
4. Permits or applications? Applying for and maintaining permission to operate, e.g. certificates, classification society costs, etc.	NR	<del>Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing</del>
Description: (if the answer is yes)		
5. Other identified burdens?	NR	<del>Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing</del>
Description: (if the answer is yes)		

### APPENDIX 3

#### CHECKLIST FOR CONSIDERING HUMAN ELEMENT ISSUES BY IMO BODIES

<p><b>Instructions:</b> If the answer to any of the questions below is:</p> <p>(A) <b>YES</b>, the preparing body should provide supporting details and/or recommendation for further work.          (B) <b>NO</b>, the preparing body should make proper justification as to why human element issues were not considered.          (C) <b>NA</b> (Not Applicable), the preparing body should make proper justification as to why human element issues were not considered applicable.</p>	
<p><b>Subject Being Assessed:</b> Modernization of the Global Maritime Distress and Safety System (GMDSS)</p>	
<p><b>Responsible Body:</b> Sub-Committee on Navigation, Communications and Search and Rescue</p>	
1. Was the human element considered during development or amendment process related to this subject?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
2. Has input from seafarers or their proxies been solicited?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
3. Are the solutions proposed for the subject in agreement with existing instruments? (Identify instruments considered in comments section)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
4. Have human element solutions been made as an alternative and/or in conjunction with technical solutions?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
5. Has human element guidance on the application and/or implementation of the proposed solution been provided for the following:	
• Administrations?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
• Ship owners/managers?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
• Seafarers?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
• Surveyors?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
6. At some point, before final adoption, has the solution been reviewed or considered by a relevant IMO body with relevant human element expertise?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
7. Does the solution address safeguards to avoid single person errors?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
8. Does the solution address safeguards to avoid organizational errors?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
9. If the proposal is to be directed at seafarers, is the information in a form that can be presented to and is easily understood by the seafarer?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
10. Have human element experts been consulted in development of the solution?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
<p><b>11. HUMAN ELEMENT: Has the proposal been assessed against each of the factors below?</b></p>	
<input type="checkbox"/> CREWING. The number of qualified personnel required and available to safely operate, maintain, support, and provide training for system.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
<input type="checkbox"/> PERSONNEL. The necessary knowledge, skills, abilities, and experience levels that are needed to properly perform job tasks.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
<input type="checkbox"/> TRAINING. The process and tools by which personnel acquire or improve the necessary knowledge, skills, and abilities to achieve desired job/task performance.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
<input type="checkbox"/> OCCUPATIONAL HEALTH AND SAFETY. The management systems, programmes, procedures, policies, training, documentation, equipment, etc. to properly manage risks.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA

<input type="checkbox"/> <b>WORKING ENVIRONMENT.</b> Conditions that are necessary to sustain the safety, health, and comfort of those on working on board, such as noise, vibration, lighting, climate, and other factors that affect crew endurance, fatigue, alertness and morale.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
<input type="checkbox"/> <b>HUMAN SURVIVABILITY.</b> System features that reduce the risk of illness, injury, or death in a catastrophic event such as fire, explosion, spill, collision, flooding, or intentional attack. The assessment should consider desired human performance in emergency situations for detection, response, evacuation, survival and rescue and the interface with emergency procedures, systems, facilities and equipment.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
<input type="checkbox"/> <b>HUMAN FACTORS ENGINEERING.</b> Human-system interface to be consistent with the physical, cognitive, and sensory abilities of the user population.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
<p><b>Comments:</b> (1) Justification if answers are NO or Not Applicable. (2) Recommendations for additional human element assessment needed. (3) Key risk management strategies employed. (4) Other comments. (5) Supporting documentation.</p> <p>The Sub-Committee on Human Element, Training and Watchkeeping (HTW) has been consulted mainly on the matters of training and model courses that will be affected by GMDSS revisions. Seafarer input has been provided by NCSR observer non-governmental organizations, and in some cases results from surveys of seafarers.</p>	

**APPENDIX 4**

**CHECK/MONITORING SHEET FOR THE PROCESS OF AMENDMENTS TO THE  
CONVENTION AND RELATED MANDATORY INSTRUMENTS  
(PROPOSAL/DEVELOPMENT)**

**Part I – Submitter of the proposal**

1	<i>Submitted by</i> <b>MSC [104]/. . . , Sub-Committee on Navigation, Communication and Search and Rescue</b>
2	<i>Meeting session</i> <b>MSC [104]</b>
3	<i>Date (date of the submission)</i>

**Part II – Details of the proposed amendment(s) or new mandatory instrument**

1	<i>High-level Action Plan</i> <b>5.1.3, 5.2.1, 5.2.5, and 5.2.6</b>
2	<i>Planned output</i> <b>Amendment to SOLAS</b>
3	<i>Recommended type of amendments (MSC.1/Circ.1481)</i> <b>Four-year cycle of entry into force</b>
4	<i>Intended instrument(s) to be amended</i> <b>SOLAS</b>
5	<i>Intended application (scope, size, type, tonnage/length restriction, service (International/non-international), activity, etc.)</i> <b>The proposed amendments should apply to all ships to which Chapter IV applies</b>
6	<i>Application to new/existing ships (i.e. if intended to be a retro-active application)</i> <b>The proposed amendments should apply to new and existing ships</b>
7	<i>Proposed coordinating sub-committee</i> <b>Sub-Committee on Navigation, Communication and Search and Rescue (NCSR)</b>
8	<i>Anticipated supporting sub-committees</i> <b>Sub-Committee on Human Element, Training and Watchkeeping (HTW) Sub-Committee on Ship Systems and Equipment (SSE)</b>
9	<i>Time scale for completion</i> <b>2021</b>
10	<i>Expected date(s) for entry into force and implementation/application</i> <b>[1 January] 2024</b>
11	<i>Any relevant decision taken or instruction given by the Committee</i>

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### ANNEX 3

#### **DRAFT TERMS OF REFERENCE FOR THE CORRESPONDENCE GROUP ON THE MODERNIZATION OF THE GMDSS**

Taking into account the Modernization Plan (NCSR 4/29, annex [...]) and the outcome of discussions at NCSR 4 (NCSR 4/29, paragraphs 12.[...] to 12.[...]) and MSC 98 (MSC 98/23, paragraphs 11.[...] to 11.[...]), the Correspondence Group on the Modernization of the GMDSS should:

- .1 develop a draft revision of SOLAS Chapters III and IV and a draft work plan for the related and consequential amendments to other existing instruments;
  - .2 submit an interim report, containing the preliminary draft revision of SOLAS Chapters III and IV and the preliminary draft work plan for the related and consequential amendments to other existing instruments, to the Joint IMO/ITU Experts Group (10 to 14 July 2017) for its consideration; and
  - .3 taking into account the outcome of discussions at the meeting of the Joint IMO/ITU Experts Group, submit a report, including the draft revision of SOLAS Chapters III and IV and the draft work plan for the related and consequential amendments to other existing instruments, for consideration at NCSR 5.
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