Instruction to RO's

Nr 8. GMDSS requirements for radio installations on board Curaçao flag vessels.

Date Entry Into Force: 01 September 2017

In accordance with art. 40 of the Ships decree 2004, a ship for which a passenger ship safety certificate or a cargo ship safety certificate is required shall satisfy a.o. the requirements of chapter IV of the SOLAS Convention applicable to that ship. Furthermore a ship for which a cargo ship radio safety certificate is required shall satisfy the requirements of chapter IV and, with regard to the radio equipment on board group life-saving appliances, chapter III of the SOLAS Convention applicable to that ship.
In this respect the Recognized Organization shall ascertain that the installation of GMDSS radio equipment complies with the requirements of COMSAR/Circ.32 (attached).
Where par.1.3.1. of COMSAR/Circ.32 refers to approved diagrams, arrangements and drawings, this shall mean approved by the Recognized Organization.

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COMSAR/Circ.32
16 August 200

HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS

1 The Sub-Committee on Radiocommunications and Search and Rescue (COMSAR), at its seventh session (13 to 17 January 2003), agreed that there were a need for harmonization of GMDSS requirements for radio installations on board SOLAS ships and prepared Guidelines* for the installation of equipment, given in the annex.

2 The Maritime Safety Committee, at its seventy-seventh session (28 May to 6 June 2003), concurred with the view of the Sub-Committee and encouraged the use of these Guidelines when implementing new GMDSS installations.

3 Member Governments are invited to bring the annexed Guidelines to the attention of all concerned, in particular, shipowners, ship operators, shipping managers, manufacturers and surveyors.

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* All references to publications and standards have been adjusted by the Secretariat.

ANNEX

GUIDELINES FOR THE HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS

CONTENTS

1 GENERAL

These guidelines were developed in order to provide Administrations, ship owners and marine electronics companies with an unambiguous interpretation of the radio installation requirements in SOLAS chapter IV, as amended, and adopted IMO resolutions. References are also made to IMO circulars, the STCW Convention and ITU Radio Regulations.

The core elements of this document give Guidelines on GMDSS installations on board ships. However, additional useful information is included from other bodies which are involved when maritime radio equipment is installed.

1.1 Application

Radio equipment installed on SOLAS ships should meet the relevant IMO requirements and ITU recommendations and should be of a type approved by the Administration.

These Guidelines are applicable when installing GMDSS radio equipment on board SOLAS ships.

The rules in these Guidelines also apply to radio installations on mobile offshore drilling units as prescribed in the MODU Code.

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Cargo ships of less than 300 gross tonnage (gt) and fishing/catching vessels are, as a general rule, not covered by SOLAS requirements. However, if such ships/vessels are going to install GMDSS radio equipment on a voluntary basis or mandatory basis according to national laws, these Guidelines should be followed as far as practicable.

These Guidelines reflect, to a large extent, unambiguous requirements in accordance with the relevant rules and regulations, see subsection 1.2. below. Other practical installation solutions than the ones emerging from these Guidelines may, however, be accepted as long as the international requirements, as laid down in the SOLAS Convention etc., are met and the installation is considered to be equivalent.

Note: - The marine electronics company which installs the radio equipment should be responsible for giving the radio operators proper familiarisation in the use of the installed radio equipment before it is put into operation.

1.2 Rules and regulations

.1 These Guidelines are prepared in accordance with the following conventions, regulations, instructions and guidelines:

.1 the International Convention for Safety of Life at Sea, SOLAS 197 , as amended;

.2 IMO resolutions (Performance standards) and IMO circulars

.3 ITU (International Telecommunication Union) Radio Regulations (RR);

. International Standards - ISO 8 68 1990 (E), annex A; and

.5 the STCW Convention (Standard of Training, Certification and Watchkeeping), as amended.

1.3 Drawings

1.3.1 General

Specified drawings (plans of the radio installation) should be prepared out well before the work on a new building or reconstruction of ships or offshore units is started. Insufficient or missing drawings may result in deficiencies during radio survey and could lead to expensive repair costs later (resolution A.7 6(18), section 8).

For the radio installation the following drawings should be prepared:

.1 antenna drawing;

.2 radio arrangement drawing; and

.3 wiring diagram.

For new buildings the antenna and radio arrangement drawings should at least be of size 1:50.

Approved as installed wiring diagram, radio arrangement, as well as antenna drawings, should be kept available on board the ship for presentation during radio survey, etc.

1.3.2 Antenna drawings

Antenna drawings should show all antennas seen from fore or aft position, the port or starboard position and from above. This applies to the following antennas:

.1 all transmitting antennas including location of antenna tuner;

.2 all receiving antennas including GNSS antennas;

.3 radar antennas;

. satellite communication antennas; and

.5 the location of float-free EPIRBs.

1.3.3 Changes in the antenna arrangement

When changes are made in the antenna arrangement, modified antenna drawings should be prepared.

1.3.4 Radio arrangement drawings (Lay-out of bridge and communication room)

These drawings should show the location of the following equipment:

.1 controllers for transmitting distress alarm;

.2 VHF radio installations, including any control units;

.3 MF or MF/HF installation, including any control units, telex printers, etc.;

. satellite communication equipment, including terminals, printers, etc.;

.5 watchkeeping receivers for VHF ch. 70, 2187.5 kHz, and HF distress channels in , 6, 8, 12 and 16 MHz bands;

.6 NAVTEX and EGC receivers;

.7 radar transponders and EPIRBs (if located on the navigating bridge);

.8 hand held (two-way) GMDSS VHF transceivers and their chargers;

.9 emergency light powered from a reserve source of energy to illuminate the mandatory radio equipment;

.10 battery charger (for the reserve source of energy); and

.11 fuse box.

1.3.5 Wiring diagram

These drawings should show the following connections etc.:

.1 antenna connections;

.2 connections to telephone exchange (PABX), fax machine, etc.;

.3 connections to the ships mains, emergency source of energy, and the reserve source of energy (batteries), and switching systems for all radio- and radio navigation equipment;

. which radio equipment (including emergency light) being connected to each power unit/source;

.5 fuses for all radio equipment;

.6 uninterruptable power supply (UPS) with all connections and fuses, if installed as power for mandatory radio equipment. (Block diagram showing how the UPS operates, showing the fuses and switch-over connections to alternative power supplies, by-pass switch, etc.);

.7 any connections (interface connections) between satellite navigator/GNSS and GMDSS radio equipment;

.8 battery chargers for the reserve source of energy;

.9 connections to gyro (if applicable);

.10 type of cables used in the installation; and

.11 connections to VDR (if applicable).

1.4 Instruction manuals and publications

The following instruction manuals and publications should be available on board:

.1 users manual (in English) for all radio equipment and battery chargers;

.2 specifications and battery capacity calculations for the installed batteries; and

.3 ITU (International Telecommunication Union) publications according to requirements in the Radio Regulations.

1.5 Tools and spare parts

As a minimum requirement, the ship should have the following tools and spare parts readily available on board:

.1 spare fuses for all radio equipment, battery circuit and main fuses where safety fuse (melting fuse) are used;

.2 reserve emergency lamps;

.3 tools necessary for simple servicing;

. acid specific density meter if the ship is fitted with lead acid accumulators; and

.5 multi-meter.

If the ship makes use of the on board maintenance method, it should be equipped with extensive test equipment and spare parts, which enable maintenance and repairs of all mandatory radio equipment while at sea.

1.6 Maintenance requirements

Ships equipped with GMDSS radio installation should meet specific requirements as to maintenance methods for the radio installation. Irrespective of sea areas, the ship should not leave harbour without being able to transmit distress alert ship-to-shore by at least two separate and independent radio communication systems.

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SOLAS ships in sea areas A1 and A2 are required to use at least one of the three specific maintenance methods, whereas SOLAS ships in areas A3 and A should use a combination of two methods.

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1.6.1 Shore-based maintenance

.1 The shipping company/ship may have a written agreement with a marine electronic company or be able to present a written declaration/plan showing how shore-based maintenance is to be carried out.

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.2 A Radio Safety Certificate issued by an Administration should be, in general, a sufficient proof that satisfied adequate maintenance arrangement has been made.

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1.6.2 At-sea electronic maintenance

If the shipowner chooses at-sea electronic maintenance, personnel with necessary qualifications and authorization for servicing the equipment should be present on board. All necessary instruments and spare parts for repair of all radio equipment should also be available when the ship is at sea.

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1.6.3 Duplication of equipment

The following additional equipment should be installed for sea areas A3 and A :

.1 VHF with DSC controller

.2 approved satellite ship earth station or complete MF/HF radio telephony station with DSC and NBDP (see note).

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Note: - Ships in sea areas A3 may choose between duplication with either complete MF/HF transceiver or approved satellite ship earth station. Ships in regular trade in sea areas A should duplicate with a complete MF/HF installation. Ships in sea area A which are not in regular trade in that area may duplicate with approved satellite ship earth station, provided a MF/HF installation is used as main station.

1.7 Ship Station Radio Licence

.1 A ship station radio licence in accordance with the Radio Regulations should be issued to the ship.

.2 The licensee (normally the shipowner) is responsible for applying for a radio licence in due time before the installation take place.

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Note: - The Maritime Mobile Service Identity (MMSI) number stipulated in the radio licence should be coded into the DSC equipment and, if appropriate, also into the satellite EPIRB. If the national authority accepts serial number or call sign for identification of EPIRB's, the correct serial number or call sign should be coded into the EPIRB.

All these identities should be changed when a ship is transferred to another flag, and appropriate steps should be taken to ensure databases held ashore are kept current.

1.8 Application for activation of satellite equipment

The licensee is also responsible for registration and service activation of satellite ship earth station.

1.9 De-activation of satellite equipment when transferring a ship to foreign flag

When transferring a ship to foreign flag, the licensee/shipowner should inform the appropriate Licensing Authority immediately concerning de-activation of satellite equipment.

1.10 Initial and annual radio survey, issuance, renewal and endorsement of Safety Radio Certificates

Survey of radio installations on SOLAS ships should be carried out in accordance with the rules laid down in IMO resolution A.9 8(23) Revised Survey Guidelines under the harmonized system of survey and certification R (adopted by IMO), and SOLAS 197 , as amended, chapter I, part B. It is important to note the following text:

.1 The radio survey should always be performed by a fully qualified radio surveyor who has adequate knowledge of the IMO's relevant Convention, particularly SOLAS and associated performance standards, and appropriate ITU Radio Regulations. The radio survey should be carried out using suitable test equipment capable of performing all relevant measurements required by these Guidelines.

.2 It is considered as very important that the responsible radio operator (holding a GOC or ROC certificate) are properly instructed and trained in how to use the GMDSS radio equipment.

.3 The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 1995, requires that the radio operator performing watchkeeping duties should:

.1 ensure that watch is maintained on the frequencies specified in the Radio Regulations and the SOLAS Convention; and

.2 while on duty, regularly check the operation of the radio equipment and its sources of energy and report to the master any failure of this equipment.

. The radio licence and certificate for the radio operator/operators should be checked during the survey.

2 FUNCTIONAL REQUIREMENTS

2.1 General

.1 The functional requirements of the GMDSS are detailed in SOLAS chapter IV, regulation .

It is of great safety importance that all requirements laid down are fulfilled. The most important requirement is that Every ship, while at sea, should be capable of transmitting ship-to-shore distress alerts by at least two separate and independent means each using a different radio communication service . It should be possible to initiate such alerts from the position from which the ship is normally navigated.

.2 Under certain conditions the satellite EPIRB may be used to meet this requirement if installed close to the navigation bridge or if it can be remotely activated from the bridge.

.3 In addition to the above-mentioned requirements, it should be possible to initiate the transmission of DSC distress alerts from the navigation bridge on VHF, and also on MF or HF, provided that the MF or HF equipment is obligatory in the trade area of the ship.

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. All ships should keep continuous watch on VHF channel 70 by use of a DSC receiver.

.5 Ships with MF requirements should in addition keep continuous watch on MF DSC 2187,5 kHz and on HF DSC distress and safety channels if required to have HF radio equipment installed (see also subsection .2. and .2.5).

.6 By resolution MSC.131(75) the Organization has decided to require all ships to maintain, when practical, a continuous listening watch on VHF channel 16 until such time as the Maritime Safety Committee may determine the cessation of this requirement, taking into account that a re-assessment will be undertaken by the Organization no later than 2005. The Maritime Safety Committee, at its seventy eighth session (May 200) agreed that listening watch on VHF channel 16 by SOLAS ships, while at sea, should be required and kept for foreseeable future with a view to providing:

.1 a distress ability and communication channel for non-SOLAS vessels; and

.2 bridge-to-bridge communications for SOLAS ships.

.7 Watch should also be kept with NAVTEX and/or with EGC receiver. The watch should be kept at the position from which the ship is normally navigated.

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2.2 Sea areas (definitions)

.1 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.

.2 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.

.3 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 (76 °N and 76 °S).

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

2.3 Equipment requirements (including duplication of equipment) for SOLAS ships

GMDSS equipment requirements in force for all passenger ships in international trade as well as cargo ships of 300 gt. and upwards in international trade:

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Equipment	A1	A2	A3 Inmarsat solution	A3 HF solution	A
VHF with DSC	x	x	x	x	x
DSC watch receiver channel 70	x	x	x	x	x
MF telephony with MF DSC		x	x		
DSC watch receiver MF 2187,5 kHz		x	x		
Inmarsat ship earth station with EGC receiver			x		
MF/HF telephony with DSC and NBDP				x	x
DSC watch receiver MF/HF				x	x
Duplicated VHF with DSC			x	x	x
Duplicated Inmarsat SES			x	x	
Duplicated MF/HF telephony with DSC and NBDP					x
NAVTEX receiver 518 kHz	x	x	x	x	x
EGC receiver	x	x		x	x
Float-free satellite EPIRB	x	x	x	x	x
Radar transponder (SART)	x	x	x	x	x
Hand held GMDSS VHF transceivers	x	x	x	x	x
For passenger ships the following applies from 01.07.97					
Distress panel (SOLAS regulations IV/6. and 6.6)	x	x	x	x	x
Automatic updating of position to all relevant radiocommunication equipment regulation IV/6.5. This also applies for cargo ships from 01.07.02 (chapter IV, new regulation 18)	x	x	x	x	x
Two-way-on-scene radiocommunication on 121,5 and 123,1 MHz from the navigating bridge. (SOLAS regulation IV/7.5)	x	x	x	x	x

) Outside NAVTEX coverage area.
) Cargo ships between 300 and 500 gt.: 1 set. Cargo ships of 500 gt. and upwards and passenger ships: 2 sets.
) Cargo ships between 300 and 500 gt.: 2 sets. Cargo ships of 500 gt. and upwards and passenger ships: 3 sets.
) Inmarsat E-EPIRB cannot be utilized in sea area A .

3 BASIC EQUIPMENT - SUPPLEMENTARY REQUIREMENTS

3.1 General requirements

Every radio installation should:

.1 be so located that no harmful interference of mechanical, electrical or other origin affects its proper use;

.2 be so located as to ensure electromagnetic compatibility (EMC) and avoid harmful interference to other equipment and systems;

.3 be so located as to ensure the greatest possible degree of safety and operational availability, with warning notice when appropriate;

. be protected against the harmful effects of water, extremes of temperature and other adverse environmental conditions;

.5 be provided with emergency lighting, which is independent of the main and emergency sources of electrical power for the illumination of the radio controls;

.6 be clearly marked with the ship s call sign, MMSI number and other identities as appropriate; and

.7 be so located that no magnetic compass lies within the stated Compass Safe Distance of the equipment.

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3.2 Use of VHF for navigational safety

Control of the VHF used for navigational safety should be available at the conning position (in the front of the navigation bridge), and where necessary, from the wings of the bridge.

Portable VHF equipment may be used to provide navigational safety from the wings of the bridge.

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3.3 Marking of radio equipment and notices

.1 All radio equipment should be duly marked with type designation. The marking should be clearly visible when the equipment has been installed.

.2 The radio installation should be duly marked with the ship s call sign, the ship s station identity and other codes applicable for the use of the radio equipment.

.3 DSC operation procedures should be posted near the DSC equipment on the navigation bridge. Emergency procedures should be posted near the relevant equipment on the bridge.

. GMDSS operating guidance for masters of ships in distress situations and the procedure False alerts , both drawn up by IMO, should be posted on the navigation bridge.

3.4 Emergency lights

.1 All mandatory radio equipment should have reliable emergency lighting powered from a reserve source of energy, which normally is the radio batteries. This light should give adequate illumination of the controls for safe operation of the radio equipment, and the working table for reading and writing.

.2 Means should be provided for dimming any light source on the equipment which is capable of interfering with navigation, i.e. by adjustable light or by use of a curtain etc. during night-time.

.3 For VHF transceivers located openly in the front of the bridge, a screened light concentrating on each single piece of equipment, should by used. Scale illumination (powered from a reserve source of energy) may be accepted provided it is sufficient for the operation of call control devices both on the VHF transceivers and the DSC controllers.

. Ceiling light may be used for equipment located in a separate radio workstation, providing it is not dazzling the navigator on watch.

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.5 The emergency light should have its own fuse circuit and fuses in each circuit. These fuses should be connected before of the main fuses in order to prevent blown main fuses to cause interruption of the emergency light.

.6 Switches for emergency lights should be properly marked.

3.5 Recommended installation

In order to meet all requirements and recommendations concerning the location of all units included in a GMDSS radio installation, it is recommended to establish either a radio work station in connection with the navigating bridge, or a separate communication office outside the navigation bridge with remote controls on the bridge. It must be emphasized, however, that the suggestions in subsections 3.5 - 3.7 below are to be considered as guidelines only. Other solutions and combinations are equally acceptable as long as the general requirements and recommendations outlined are fulfilled.

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3.5.1 Radio work station

.1 The work station should be located in the aft of the navigation bridge so that the navigator has an over all view of the navigation while operating the radio equipment. If the work station and the rest of the navigation bridge are separated by a wall it should be made of glass or fitted with windows. There should be no lockable door between the work station and the navigation bridge.

.2 When the work station is being used during night-time, a curtain should be provided in order to avoid dazzling effect from the lights.

.3 All mandatory radio equipment (except mandatory VHF, see subsection .1.1.) should be located in the radio work station. Watch receivers may alternatively be located elsewhere on the navigation bridge.

Note: - It is essential that satisfactory watch (clearly audible signals/visual alarms) can be maintained at the position from which the ship is normally navigated. If it is not possible to maintain satisfactory watch, alarm indicators on MF or MF/HF and Inmarsat equipment, including EGC printer, should be located outside this work station.

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. MF/HF RF power amplifiers should be located in a separate and screened room. Antenna tuners should, as a general rule, be located outdoors below the antenna.

3.5.2 Communication office

.1 The communication office may be located as required by the shipping company, e.g. in connection to the captain s office. It should be possible to make public calls and perform general radiocommunications on MF or HF and/or through satellite from the communication office, if such calls cannot be made from a suitable location elsewhere on the ship.

.2 All equipment for written correspondence, as well as telephone services for MF/HF and Inmarsat, should be located in the communication office.

.3 The remote operation panels for the mandatory equipment should be located in a central position on the navigation bridge, in order to fulfil the requirements for transmitting distress alerts from the navigation bridge.

Note: - Consideration should also be given to the requirements for navigational safety communication and subsequent distress communications on MF or HF. When MF/HF DSC is included in the mandatory basic or duplicated radio equipment, it should be possible to conduct distress and safety communications from the navigating position, and the MF/HF DSC controller should be installed in this position.

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. Watch receivers and NAVTEX/EGC receivers should be located on the navigation bridge.

.5 VHF transceivers with DSC used for navigational safety should be located in the front of the navigation bridge.

3.6 Ships with integrated bridge system (IBS)

.1 Ships constructed to satisfy the IBS requirements for single-manned navigating bridge should have the operation panels for mandatory GMDSS equipment installed as close to the conning position as possible.

.2 Equipment for the transfer of radio telephone calls via radio (VHF, MF or MF/HF) or satellite to other areas of the ship should be placed close to the other GMDSS equipment near the conning position.

.3 It should be possible also to operate printed communications (data communications via radio and/or Inmarsat) from other areas of the ship.

3.7 Ships with integrated radiocommunication systems (IRCS)

.1 The IRCS is a system in which individual radiocommunication equipment and installations are used as sensors, i.e. without the need for their own control units, providing outputs to and accepting inputs from the operator s position, called workstations. Such workstations are called GMDSS workstations if they include control and monitoring of all equipment and installations provided on a ship for the GMDSS which are also suitable for general radiocommunications. The IRCS workstation should be installed in a console located in a central position on the navigation bridge.

Transmitting and receiving equipment may be located outside the navigation bridge.

.2 The IRCS should comprise at least two GMDSS workstations each connected to each GMDSS radiocommunication sensor over a network or connection system. At least two printers should be installed. All requirements laid down in SOLAS 197 , as amended, chapter IV, should be fulfilled.

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4 GMDSS RADIO EQUIPMENT

4.1 Location of VHF transceivers and VHF DSC controllers

.1 VHF with DSC forming part of the mandatory VHF communication equipment for safety of navigation should be located in the conning position. This equipment may be connected to several remote control units, i.e. on the wings of the navigation bridge, provided that the navigating bridge has priority. If such combined equipment is chosen, it should be possible to transmit DSC distress alert from the conning position.

.2 If the ship is equipped with extra VHF transceiver (without DSC) with channels required for navigational safety, located in the conning position, another central location of the mandatory DSC VHF equipment on the navigation bridge (in navigating position) can be accepted.

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Note: - With regard to the location of equipment and distress alerts, the same requirements also apply to the duplicated DSC VHF equipment for ships in sea areas A3 and A . The duplicated VHF transceiver can, however, be located in the navigating position instead of in the conning position.

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In order to conduct power measurements, easy access to the antenna output of each equipment should be provided.

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4.2 Continuous watch on DSC VHF channel 70

Continuous watch on DSC VHF channel 70 can be met by:

.1 a separate VHF channel 70 watch receiver. It should not be muted or interrupted when using other radio equipment, or

.2 a dedicated watch receiver combined with the VHF transceiver. It should be installed so as to maintain watch even when the VHF equipment is used for telephony, or

.3 VHF with DSC permanently locked on channel 70 for reception and transmission of DSC calls only. To deal with other correspondence on other channels, an additional VHF transceiver should be installed, which may be without the DSC function.

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4.3 Location of MF/HF transceivers

.1 If the equipment is main or duplicated equipment, it should be possible to activate the distress alert from the navigation bridge. If the equipment can be remote operated from other positions on board the ship, priority should be given to the unit on the navigation bridge.

.2 With regard to a MF installation, the requirement for DSC distress alerts on 2187,5 kHz can also be fulfilled by a remote-activated MF control unit locked on 2187,5 kHz with alert activated from the navigation bridge.

Note: - DSC on MF is required in sea areas A2, A3 and A , irrespective of selected radio equipment solution. It should therefore always be possible to activate the DSC distress alerts on 2187,5 kHz from the navigation bridge.

If combined MF/HF radio equipment is chosen as mandatory GMDSS equipment, it should also be possible to activate the distress alert from the navigating bridge on the mandatory HF DSC frequencies.

If MF/HF installation is chosen as duplicated equipment (Inmarsat option) on a ship for sea area A3, there is no requirement for an extra DSC watch receiver.

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.3 RF power amplifiers should, as a general rule, not be located in the navigation bridge area. Location in such area may, however, be accepted if it can be granted that the EMC requirements are fulfilled. The antenna tuner should, as a general rule, be located in an outdoor position below and close to the antenna.

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. The MF or MF/HF transmitter should be equipped with an instrument or other provisions indicating antenna current or power delivered to the antenna.

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.5 If the transmitter antenna is not permanently connected to the transmitter, it should be automatically connected before the distress alert is transmitted.

4.4 Watchkeeping receivers for DSC

.1 Depending on the trade area and mandatory radio equipment of the ship, continuous watch is required via separate receivers for DSC channel 70, MF DSC 2187.5kHz and HF DSC 8 1 .5 kHz, as well as minimum one of the frequencies 207.5 kHz, 6312 kHz, 12577 kHz and 1680 .5 kHz.

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.2 The watch receiver for VHF DSC channel 70, MF DSC 2187.5 kHz and HF DSC scanning receiver should be located so that the alarm is clearly audible and visible all over the navigation bridge.

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.3 It should be possible to read the DSC alert messages on the navigation bridge. The printer (if any) or display etc. may be common for all DSC watch receivers, provided that messages coming in simultaneously are arranged in queue and printed as soon as the printer/display is ready.

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. Easy access to the antenna connector should be possible in order to conduct test of the equipment by means of measuring instruments.

Note: - There is no requirement for a duplicated MF/HF DSC watch receiver for ships in sea areas A3 or A when maintenance method duplication of equipment is used.

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4.5 Watchkeeping on MF or MF/HF DSC

4.5.1 Continuous watch on the MF DSC distress frequency 2187.5 kHz to be kept by:

.1 a separate DSC watch receiver locked on 2187.5 kHz; or

.2 a dedicated watch receiver combined with the MF radiotelephone.

Note: - If DSC operation is desirable on other frequencies, an additional scanning receiver should be provided. Other frequencies than those used for distress and safety should not be included in the receiver dedicated for DSC emergency watchkeeping. A single DSC decoder may be used to serve both the DSC watch and the additional scanning receiver.

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4.5.2 Continuous watch on MF/HF DSC distress and safety frequencies to be kept by:

.1 a separate MF/HF DSC scanning receiver for distress and safety frequencies only; or

.2 a dedicated MF/HF DSC scanning watch receiver for distress and safety frequencies only combined with the MF/HF radiotelephone.

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Note: - If DSC operation is desirable on other frequencies, an additional scanning receiver should be provided. The receiver may be combined with the watch receiver for MF DSC. A single DSC decoder may be used to serve both the DSC distress and safety frequency scanning receiver and the additional scanning receiver only if continuous watch for distress and safety calls can be maintained.

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4.5.3 Watchkeeping on DSC calling frequencies

.1 For watchkeeping on other frequencies than distress and safety frequencies (national and international DSC calling frequencies), a separate scanning receiver should be provided.

Note: - According to SOLAS regulation IV/ .1.8, there is a general requirement for transmitting and receiving General radio communications . Ships in sea areas A2 should, according to this requirement and according to SOLAS regulation IV/9.3, be able to transmit and receive general radiocommunications on MF or MF/HF telephony or NBDP or Inmarsat ship earth station. Ships in sea area A2, which is equipped in accordance with the minimum SOLAS requirements (i.e. VHF and MF with DSC), should be provided with equipment for listening and calling on national and international MF DSC calling frequencies. Alternatively, they may be provided with Inmarsat equipment in order to fulfil the general and public correspondence requirements.

According to IMO's performance standards, resolutions A.80 (19) and A.806(19), as amended, it is required that the DSC equipment should have possibilities as to be used also for public correspondence . For ships in sea areas A3 and A the installed equipment (MF/HF or Inmarsat, depending on installation solution) should also be used for common radiocommunications. In these sea areas the requirements for general or public correspondence are normally fulfilled either by using the HF or Inmarsat equipment.

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4.6 Satellite ship earth station (SES)

.1 If the equipment is the main station or duplicated equipment, it should be possible to activate the distress alert from the navigation bridge.

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.2 The terminal and telephone, if any, may be placed in a radio workstation in connection with the navigation bridge or in a separate communication office.

.3 The satellite terminal and/or external printers may also be located elsewhere in the ship.

Note: - Attention should be made to IMO resolution A.807(19), as amended, Annex, paragraph 3.2 regarding Inmarsat-C, which has the following text:

> Ip tc r r a ttd r p didpdhpr hir mhkr rdtp rtt eh t f m pcr a tdpd i f m wcdec pcr tcda dt i mh y ihvdehprr hir f m hp rhtp ir pcr a tdpd i rrtdeihprr f rdtp rtt h r pdie"

The words one other position designated for distress alerting is only actual for ships which have defined an additional place/room on board to be such other position . Normally it will be accepted that Inmarsat-C equipment is installed in the radio work station if it is provided with facilities for conducting distress alerts from the navigation bridge. It is, however, recommended that the Inmarsat-C terminal, including additional equipment, should be located on the navigation bridge in order to make it possible to conduct follow-up distress communication from this position.

4.7 Connection of external located data terminal to mandatory Inmarsat-C ship earth station in the GMDSS

If the licensee/shipowner wants to connect the mandatory Inmarsat-C terminal i.e. to the ship s PC-network or to an outside located data terminal, all mandatory GMDSS requirements in accordance with SOLAS 197 , as amended, should always be fulfilled.

In that case, the dedicated printer should be connected permanently to the output of the mandatory Inmarsat terminal s printer output. A manually operated and duly marked switch, located near the Inmarsat terminal, should be installed to disconnect the Inmarsat terminal from the external equipment.

4.8 Extra requirements for passenger ships

.1 A distress panel should be installed at the conning position, i.e. within the range of the manoeuvring consol in the front of the navigation bridge.

.2 This panel should contain either one single button which, when pressed, indicates a distress alert using all radiocommunication installation required on board for that purpose; or

.3 One button for each individual radio installation which are installed.

. The distress alert panel should clearly and visually indicate whenever any button or buttons have been pressed. Means should be provided to prevent inadvertent activation of the button or buttons.

Note: - The alert button or buttons should be protected against inadvertent activation by use of a spring loaded lid or cover permanently attached by e.g. hinges in order to fulfil the requirement of carrying out at least two independent actions when transmitting distress alert; IMO requirements in force from 23 November 1996. (The button or buttons should be pressed for at least 3 seconds before the alarm is activated.)

.5 If the installed satellite EPIRB is used as the secondary (mandatory) means of distress alerting and is not remotely activated, it should be acceptable to have an additional EPIRB (06 MHz or Inmarsat-E float-free or manual) installed on the navigation bridge near the conning position.

.6 Information on the ship s position should be continuously and automatically provided to all relevant radiocommunication equipment to be included in the initial distress alert when the button or buttons on the distress panel is pressed (i.e. interface connection from the ship s GNSS receiver should be provided, where GNSS is not integrated).

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.7 The distress alert panel is normally included in the distress panel and should provide visual and aural indication of any distress alert or alerts received on board and should also indicate through which radiocommunication service the distress alerts have been received.

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Note: - The following guidelines (table) should apply with regards to the connection of equipment to the distress panel in order to fulfil the IMO requirements concerning ship-to shore distress alerts by at least two separate and independent means:

Sea areas	Equipment
A1	VHF DSC, VHF DSC EPIRB or satellite EPIRB
A1+A2	VHF DSC, MF DSC, satellite EPIRB
A1+A2+A3 (alternative 1)	VHF DSC, MF DSC, Inmarsat, satellite EPIRB
A1+A2+A3 (alternative 2)	VHF DSC, MF/HF DSC, satellite EPIRB
A1+A2+A3+A	VHF DSC, MF/HF DSC, Inmarsat, satellite EPIRB

Note: - Only radio equipment according to SOLAS 197 , as amended, chapter IV are required to be connected to this distress panel to fulfil the requirement for ship-to-shore distress alerts by means of at least two separate and independent means. The duplicated equipment, as required by IMO resolution A.702(17) for ships in sea areas A3 and A , are, therefore, in general, not required to be connected to the distress panel if it is granted that distress alert can be transmitted from the duplicated equipment in a position close to the installed distress panel.

4.9 NAVTEX and EGC (Enhanced Group Call) receiver

.1 The printer for NAVTEX and Inmarsat EGC receiver should be located on the navigation bridge. As mandatory equipment in the GMDSS, these receivers should also, as a general rule and in the same way as required for other permanent installed equipment, have their own permanent installed power supplies with fuse circuits/fuses, cf. subsection 7.19. Antenna and antenna cable should also be permanently installed.

.2 The mandatory requirement for an EGC receiver may be combined with Inmarsat equipment. It is recommended that a dedicated EGC receiver is used, enabling continuous reception of MSI (Maritime Safety Information) messages independent of whether the Inmarsat equipment is being used or not. Class 3 EGC is included in the Inmarsat-C, but only shares the antenna with this equipment and functions in parallel with and separate of the Inmarsat-C equipment.

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4.10 Satellite float-free EPIRB

The satellite float-free EPIRB should be located/installed so that the following requirements are fulfilled:

.1 The EPIRB should, with greatest possible probability, float-free and avoid being caught in railings, superstructure, etc., if the ship sinks.

.2 The EPIRB should be located so that it may be easily released manually and brought to the survival craft by one person. It should therefore not be located in a radar mast or any other places which can only be reached by vertical ladder.

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Note: - A float-free EPIRB may also be used to fulfil the requirements for one piece of equipment (of two), which is capable of transmitting distress alert to shore from or near the navigating bridge of the ship. Under such conditions the float-free EPIRB should fulfil the following additional requirements with regards to location/installation:

.3 The EPIRB must be installed in the vicinity of the navigation bridge, i.e. on the wings of the navigation bridge. Access via vertical ladder should not be accepted. A location on the top of the wheelhouse may be accepted to fulfil the requirement if accessible by stairs; or

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. It may be possible to activate the EPIRB remotely from the bridge. If remote activation is used, the EPIRB should be installed so that it has unobstructed hemispherical line of sight to the satellites.

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Note: - It should be considered that the main function of the EPIRB is float-free activation. If the additional requirements mentioned above cannot be met without reducing the reliability of the float-free activation, priority should be given to this requirement. Alternatively, two float-free EPIRBs should be installed.

.5 The EPIRB should be equipped with a buoyant lanyard suitable for use as a tether to life raft etc. Such buoyant lanyard should be so arranged as to prevent its being trapped in the ship s structure.

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.6 The EPIRB should be marked with the ship s call sign, serial number of EPIRB, MMSI number (if applicable),15 Hex ID, and battery expiry date.

4.11 Search and rescue radar transponders (SART)

.1 The search and rescue radar transponders should be placed in brackets on both sides of the ship and preferably visible from the navigation bridge. It should be easy to bring the transponders to the lifeboats or life-rafts. A visible location inside the navigation bridge, close to the outer doors, is recommended.

Alternatively one radar transponder should be placed in bracket in each survival craft (normally covered lifeboats) if such location permits rapidly replacing of the SARTs into any survival crafts which may be used in emergency situations.

The SART should be provided with a pole or other arrangement compatible with the antenna pocket in the survival craft in order to fulfil the required height of at least 1 metre above sea level.

.2 On ships carrying at least two radar transponders and equipped with free-fall lifeboats one of the radar transponders should be stowed in a free-fall lifeboat and the other located in the immediate vicinity of the navigation bridge so it can be utilized on board and ready for transfer to any of the other survival craft.

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.3 The SARTs should have waterproof marking with operational instructions, battery expiry date and the ship s name and call sign.

4.12 Hand held (Two-way) GMDSS VHF transceivers

.1 Obligatory hand-held VHF transceivers including their emergency batteries (primary batteries normally of Lithium type) should be located in a central and easily accessible position on the navigation bridge. If such equipment is placed in a lockable cabinet, it should be possible to get easy access to the hand-held VHF transceivers without the use of tools.

.2 Primary batteries should be sealed for use only in emergency situations and marked by the supplier with battery expiry date. The battery will be considered as exhausted and used if its seal is broken, and a new battery will be requested during radio survey, cf. the IMO requirement for 8-hours operation in emergency situations.

.3 If hand-held VHF with re-chargeable NiCd batteries (secondary batteries) are used for on-board communications, chargers for these batteries should be provided.

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. Hand-held VHF transceivers should have waterproof marking with the ship s name and call sign. The primary battery should be marked with expire date. Channel numbers should be stated on the equipment.

4.13 Hand-held VHF transceivers and communications from the wings of the navigation bridge

Requirements for radiocommunications from the wings of the navigation bridge are laid down in the SOLAS Convention. In order to fulfil this requirement, mandatory hand-held GMDSS VHF can be used. (see subsection .10). Alternatively a simplex VHF transceiver (single frequency only) or remote controlled units with channel selector, loudspeaker and microphone may be installed in these positions. These remote controlled units should be controlled by a VHF installed in the front of the navigation bridge.

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4.14 Aeronautical mobile emergency radiocommunication equipment

.1 All passenger ships should be provided with means for two-way on-scene radiocommunications for search and rescue purposes using the aeronautical frequencies 121.5 MHz and 123.1 MHz from the navigation bridge.

Such equipment should be marked with the ships name and call sign. The primary battery should be marked with expiry date.

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.2 Approved equipment may be of a fixed type or a hand-held type. The equipment should be provided with the frequencies 121.5 MHz and 123.1 MHz only.

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4.15 GNSS – global navigational satellite system

.1 In passenger ships irrespective of size, information on the ship s position should be continuously and automatically provided to all relevant radiocommunication equipment. With such connections the ship s position will be included in the initial distress alerts.

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.2 In cargo ships, where GNSS should be installed in accordance with new regulation V/19, automatic updating of the ship s position into the DSC equipment and Inmarsat equipment should be possible. If such automatic updating is not possible, it is required to enter the ship s position manually into relevant GMDSS equipment at intervals not exceeding hours whenever the ship is under way.

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If the GNSS is connected to the GMDSS equipment, it should (similar to the mandatory GMDSS equipment) be supplied with energy from the reserve source of energy/batteries.

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4.16 Connections of navigational sensors

4.16.1 GNSS - Receiver

A GNSS receiver should be connected to the relevant radio communication equipment (DSC controller, GMDSS satellite equipment) in order to provide information on the ship s position continuously and automatically to the radio equipment.

The GNSS receiver should (similar to the mandatory GMDSS equipment) also be supplied with energy from the reserve source of energy/batteries.

4.16.2 Heading sensor

If the GMDSS satellite equipment requires automatic antenna adjustment according to ship s heading, the heading sensor (GYRO) should be connected.

In this case the GYRO should also be supplied with energy from the reserve source of energy/batteries.

5 ANTENNA INSTALLATION

5.1 General

Special attention should be paid to the location and installation of the different antennas on a ship in order to ensure effective and efficient communication. Incorrect installed antennas will degrade the performance of the radio equipment and will reduce the range of radiocommunications.

5.2 Location of VHF antennas

.1 VHF antennas should be placed in a position which is as elevated and free as possible, with at least 2 metres horizontal separation from constructions made by conductive materials.

.2 VHF antennas should have a vertical polarisation.

.3 Ideally there should not be more than one antenna on the same level.

. The location of mandatory VHF antennas should be given priority compared with mobile telephone antennas. If they are located on the same level, the distance between them should be at least 5 metres.

.5 It is recommended to use double screened cable with a maximum loss of 3 dB.

.6 All outdoor installed connectors on the coaxial cables should be watertight by design in order to give protection against water penetration into the antenna cable.

.7 AIS VHF antenna should be installed safely away from interfering high-power energy sources like radar and other transmitting radio antennas, preferably at least 3 metres away from and out of the transmitting beam.

.8 The AIS VHF antenna should be mounted directly above or below the ship s primary VHF radiotelephone antenna, with no horizontal separation and with minimum 2 metres vertical separation. If it is located on the same level as other antennas, the distance apart should be at least 5 metres.

5.3 Location and choice of MF/HF antennas

.1 The mounting arrangement of the antenna or pedestal should be constructed in order to withstand the strain from swaying and vibration.

The transmitting whip antenna should be installed as vertical as possible.

.2 Wire antennas should be protected against breakage by having a weak link installed.

.3 Whip antennas should be installed as vertical as possible and located in an elevated position on the ship at least 1 metre away from conductive structures.

. Attention should be paid to self-supportive vertical antennas and their swaying radius.

.5 The recommended minimum length of the antenna is 8 metres.

.6 The down lead from the base of the antenna to the antenna tuner should be insulated and run as vertically as possible and not less than 5° towards the horizontal plane.

.7 The transmitting antenna should have an insulation resistance to earth which is recommended to be of more than 50 MΩ in dry weather and of no less than 5 MΩ in humid weather (transmitter to be disconnected when measuring).

5.4 Location of antenna tuner for MF/HF transceiver

The antenna tuner should normally be located externally (outdoor) and as close to the antenna as possible, and so that the down lead wire/cable from the antenna should be as vertical as possible.

5.5 Receiving antennas

.1 As a general rule, all receivers including watchkeeping receivers should have their own separate antenna.

.2 Antennas for watchkeeping receivers should be located as far away as possible from MF/HF transmitting antennas in order to minimise receiver blocking.

5.6 Satellite communication antennas

5.6.1 General

.1 In general, satellite antennas should be located so that they have a 360° free view for the satellite at all times. In practice terms this can be difficult to achieve due to shadow sectors from nearby structures.

.2 It is recommended for Inmarsat-A , B and F-77 antennas (stabilized directional antennas) that communication should be maintained with the satellite down to an elevation of minus 5°. For Inmarsat-C (omni-directional antenna) it is recommended that communication should be maintained with the satellite down to an elevation of minus 5° in the fore and aft direction and minus 15° in the port and starboard direction.

5.6.2 Satellite communication antenna installation

The following guidelines should be observed in order to fulfil the above recommendations:

.1 The antenna should be located at the top of the radar mast; or

.2 On a pedestal, in the radar mast, or on the top deck so that:

- for directive antennae; shadows from constructions, especially within a distance of 10 metres, is maximum 6°;

- for omnidirectional antennas; shadows from constructions, especially within a distance of 1 metre, is maximum 2°.

.3 Antennae should be installed in a readily accessible location.

. Satellite antennae should not be located in an area where they can be damaged by heat and smoke.

.5 The satellite antenna should not be located on the same plane as the ships radar antenna.

.6 GNSS antennae should not be located close to or on the same plane as the Inmarsat antenna.

.7 Consideration should be given to installing the Inmarsat antenna on a suitable pedestal.

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Note: - The mast/or pedestal should be constructed so that vibrations are reduced as much as possible.

5.6.3 Safe antenna distances

The following safe distance from Inmarsat antennas to other antennas and to the compass are recommended:

.1 Distance to the HF antenna should be more than 5 metres.

.2 Distance to VHF antennas should be more than metres.

.3 Distance to the magnetic compass should be more than 3 metres.

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5.6.4 Inmarsat-C antenna

The antenna should be constructed so as to function up to 15° pitch and roll. In order to obtain this result, the antenna should be located in such position that no objects or constructions down to 15° below the horizon are degrading the performance of the equipment.

Note: - As it may be difficult to fulfil this recommendation in fore-and-aft, the free area in this direction may be reduced to 5° below the horizon.

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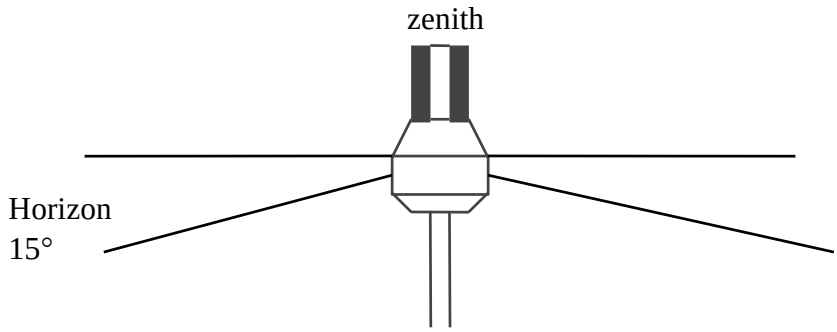
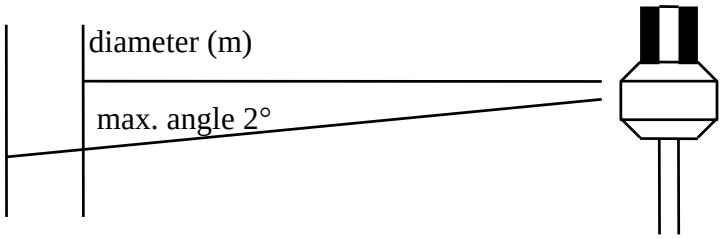


5.6.5 Calculation of distance to obstructions:

If obstructions such as i.e. mast, funnel etc. is unavoidable, the following guidelines should apply:

The distance to the obstruction should be so that the obstruction only covers a 2° sector.

Note: - In such case the safe distance will be the following: 20 x the diameter of the obstruction (in metres).



If two Inmarsat-C antennae are installed the vertical distance between them should be at least 1 metre to eliminate interference.

5.6.6 Antenna cable

The manufacturers specifications regarding total attenuation and maximum DC resistance (short-circuit in one end) should be complied with. Only double-screened cable should be used.

5.6.7 Antennas for voluntary radio equipment

Antennas for voluntary radio equipment may be located on deck, provided its use does not interfere with antennas of mandatory radio equipment. When mobile telephone is installed on board ships, special attention should be made to the facts that some types of mobile telephones (especially GSM telephone equipment) may interfere with the ship s navigational equipment (especially GNSS) and other electronic equipment.

5.7 Installation of coaxial cables

Coaxial cables should be installed in separate ducting and at least 10 cm away from power supply cables.

Incorrect installation of cables my change their characteristic impedance resulting in power reflections, which will attenuate the RF signal and reduce the efficiency of the radio equipment.

In VHF antennas the reflected power should not be greater than 10% of the measured output power.

The following guidelines should be applied when bending coaxial cables:

.1 Cables should be crossed at right angles.

.2 Where there is one bend in a permanent fixture the bending radius should be 5 times the cables outside diameter.

.3 Where there are several bends, the bending radius should be 10 times the outside diameter of the cable.

. When using flexible cable the bending radius should be 20 times the outside diameter of the cable.

6 EMC, EARTHING AND SCREENING

6.1 Electromagnetic Compatibility (EMC)

6.1.1 General

All reasonable and practical steps should be taken to ensure EMC compatibility between the equipment concerned and other radio communication and navigational equipment carried on board in compliance with the relevant requirements of chapters IV and V of the SOLAS Convention, as amended. In order to avoid interference the following rules applies:

.1 Radio installations should not cause harmful interference to other electronic, electrical or navigational systems on board ships.

.2 However, other systems should not cause harmful interference to the radio installation.

.3 In order to avoid electromagnetic noise interference it is essential that manufacturers guidelines relating to EMC, screening and earthing are correctly followed.

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6.1.2 Voluntary radio equipment

Additional, voluntarily carried non-GMDSS radio equipment may be as follows:

- mobile telephone;
- radio amateur stations; and
- satellite stations.

Operation of such equipment is at the discretion of the master. It may be installed on the bridge provided that the EMC requirements are fulfilled and navigation and radio communication is not degraded.

6.2 Screening of cables

In order to avoid interference the following guidelines should apply with regards to screening of cables:

.1 Coaxial down leads should be used for all receiving antennas and the coax screen should be connected to ground on at least one end.

.2 All cables within a distance of 2 metres from a transmitting antenna should be screened and the screen properly earthed in a metal tube or duct.

6.3 Earthing

Earthing of radio equipment should be carried out in accordance with appropriate guidelines for Earthing in Maritime Installations required in international standards. Great care should be taken in order to fulfil the following rules:

.1 Each unit of radio equipment should have a separated earth connection.

.2 MF/HF antenna tuners should be earthed with either a copper bar or copper band.

.3 The earthing bar or strap should be as short as possible, should not be more than one metre in length, and should be at least 60 mm in width.

. For earthing straps up to 5 metres in length the width should be at least 100 mm (May be relevant on board vessels made of wood or synthetic materials).

.5 It should be noted that a long earthing strap or bar will act as an antenna and radiate energy.

.6 Copper bars and straps should be brazed to the steel bulkhead in order to eliminate corrosion and vibration and make a good earth connection.

.7 Great care should be taken when earthing radio equipment on ships with aluminium superstructures in order to avoid galvanic corrosion. An approved and acceptable method of earthing should be used on such ships.

Note: - Insufficient earthing of the power amplifier may lead to capacitive and inductive connections between power cables etc. and cause interference to fire alarms, navigational equipment, inter-communication and other equipment. The transmitter output power may also be reduced.

7 SOURCES OF ENERGY

7.1 Main source of electrical power

The main source of electrical power is defined as the ship s mains. All the basic and duplicated equipment should have an independent power supply from the ships mains. The battery charging arrangement used to charge any batteries associated with the reserve source of energy should also have an independent supply from the ships mains.

It is not advisable to provide the main source of electrical power to the GMDSS communication equipment through the battery charger. If a fault occurs in the battery charger, which renders it defective, it may not be possible to operate the equipment from the ship s mains. Batteries used in the reserve source of energy will become discharged eventually leading to loss of all power supplies.

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7.2 Emergency source of electrical power

The emergency source of electrical power is defined as the emergency supply and is usually taken from the ship s emergency generator. SOLAS requirements for the emergency source do not apply to cargo ships of less than 500 gross tonnage (gt). All other SOLAS ships constructed on or after 1 July 1986 are required to have an emergency source of electrical power. It should be observed that the GMDSS requirements concerning the emergency source have been made compulsory only for ships constructed later than 1 February 1995.

The emergency source should be adequate to operate both the basic and duplicated equipment (if applicable) for the duration as specified in SOLAS chapter II, i.e. 18 hours on cargo ship and for 36 hours on passenger ship.

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7.3 Reserve source of energy

.1 The radio reserve source or sources of energy should meet the requirements set out in regulation IV/13 of SOLAS 197 , as amended, and in IMO resolutions A.69 (17) and A.702(17), as applicable. It usually consist of rechargeable batteries and is used to supply the communication equipment in the event of failure of the ship s mains and emergency source of electrical power.

All passenger ships irrespective of size and cargo ships of 300 gt. and upwards should have a reserve source or sources of energy for the operation of the basic equipment, and the duplicated equipment if such equipment is required.

.2 The changeover from the ship s mains or emergency supply to the reserve source of energy should be done automatically and in such a manner that both the basic and duplicated communication equipment will be connected simultaneously. Where the changeover is done manually, the switch should be readily accessible to the radio operator, clearly labelled and located on the navigation bridge. Such changeover should not result in the loss of data stored in memories.

.3 One bank of batteries may be acceptable if the capacity is sufficient to operate both the basic and duplicated radio equipment simultaneously. The battery capacity should also be sufficient to operate the gyro (if applicable), GNSS and emergency light.

. Any fault in the radio batteries or the battery charger should not affect both the basic and duplicated radio equipment and should not prevent the operation of the radio equipment from the ship s mains or emergency supply.

.5 The reserve source of energy should be capable of operating the radio installation for at least:

.1 1 hour on ships provided with an emergency supply which is adequate to operate the radiocommunication equipment for a period of 18 hours on cargo ships and 36 hours on passenger ships; or

.2 6 hours on ships not provided with an emergency supply as outlined in .1 above.

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7.4 Radio battery capacity

When defining the minimum required battery capacity, consideration should be given to the expected extreme temperatures for the location of the battery and reduction of its capacity during its lifetime in addition to the loads which are to be connected to it.

.1 The batteries should have enough capacity to operate all the GMDSS radio equipment for the specific times outlined in subsection 7.3.5 above. The total load for the entire radio installation should be calculated prior to the installation of any radio batteries for the reserve supply.

.2 Where the basic and duplicated radio equipment cannot be operated simultaneously, the battery capacity should be sufficient to operate the equipment with the highest power consumption.

.3 Where the basic and duplicated radio equipment are connected simultaneously the battery capacity should be sufficient to meet the average consumption of all connected equipment including any additional loads such as printers, VDUs etc.

. If the capacity requirement of radio batteries is to be maintained over their normal life cycle, an extra 0% capacity should be added to the minimum calculated capacity.

.5 When calculating discharge time the following guidelines may be of assistance:

.1 the capacity of a lead acid battery is normally quoted at 20 hours of discharge at an operational temperature of 20°C;

.2 the capacity at 1 hour discharge is approximately 50% of the capacity at 20 hours discharge;

.3 the capacity at 6 hours discharge is approximately 80% of the capacity at 20 hours discharge; and

. for batteries other than the lead acid type the capacity at 1 hour discharge is approximately 60% of the capacity at 10 hours discharge and 6 hours discharge will be approximately 92% of the capacity at 10 hours discharge.

.6 The capacity of the radio batteries should be checked at intervals not exceeding 12 months when the ship is not at sea. One method of checking the capacity is to fully discharge and recharge the batteries using normal operation current over a period of 10 hours. Assessment of the charge condition can be made at any time, but it should be done without significant discharge of the battery when the ship is at sea. Another method could be to check the capacity by means of a battery tester, e.g. in connection with a radio survey.

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Note: - When determining the battery capacity the following should also be taken into consideration:

- the battery is normally not fully charged;
- reduction of capacity due to ageing;
- reduction of capacity due to high or low temperatures; and
- reduction of capacity due to rapid discharge.

7.5 Radio batteries

The batteries should be properly marked with type or construction, rated capacity, and installation date. The marking should be visible when the batteries have been installed and during their lifetime A label warning of explosion danger should be displayed near the installed batteries.

.1 Any type or construction of batteries (e.g. lead acid, alkaline, maintenance free, traction, semi-traction, etc.) may be used as reserve source or sources of energy, taking into consideration the environmental conditions of the location where they are installed.

.2 The battery should maintain its rated capacity when inclined at any angle up to 22 1;° in any orientation.

.3 All battery units should be securely braced so that they will not be dislocated by movement of the ship.

. An instruction manual which contains all necessary specifications of the batteries should be available on board. The information should include at least:

.1 capacity and temperature range within which the stated capacity is maintained for the specific operation period i.e. 1 hour or 6 hours;

.2 charging voltage and current limits in order to keep batteries fully charged while preventing overcharging;

.3 actual specific gravity of the electrolyte and/or cell voltages or the voltage of the fully charged battery;

. guidelines on how to carry out a controlled discharge test;

.5 methods of determining the condition of charge of the battery, e.g. check of specific gravity of electrolyte (acid density) or check of battery cell voltage/battery voltages by using an accurate measuring instrument in according with the battery manufacturer s specifications;

.6 requirement for ventilation; and

.7 requirement for maintenance.

.5 Equipment requiring a lower voltage than the total voltage of the battery bank should not be connected to a part of the battery bank.

.6 The batteries should be installed in the upper part of the ship, in an elevated position and as close to the radio equipment as possible.

.7 An outdoor located battery case should be avoided due to considerable temperature variation.

Note: - Ideal location for the radio batteries is in a battery room with a constant temperature of approx. 20°C.

The location should in general satisfy the manufacturers specifications with regards to temperature tolerance and environmental strain in accordance with IEC 609 5 or other equivalent standards.

.8 Batteries of different types, different cell constructions, different capacities or different manufacturers should not be mixed in a battery bank.

.9 Batteries of different types and different cell construction should not be installed in the same location if they can affect each other.

.10 Sufficient ventilation for batteries should be provided, as required by the battery manufacturer.

.11 Electrical installations including battery chargers, located in the battery room, should be intrinsically safe.

.12 Sufficient space between batteries or battery banks should be provided in order to enable inspections and maintenance.

.13 The cabling from the batteries should be protected against earth and short-circuits and be appropriately fused and installed according to recognized international standards (IEC 60092-101 and IEC 60533). Battery cables should have sufficient dimensions to prevent voltage reduction at peak current consumption.

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7.6 Uninterruptable power supplies (UPS)

A UPS is defined as a device which for a specific period of time supplies continuous power to radio equipment independent of any power failures in the ship s main or emergency source of electric energy. The UPS, installed as the reserve source or sources of energy, should meet the general requirements set out in regulation IV/13 of the SOLAS 197 , as amended, and in resolution A.69 (17), as applicable, and should also comply with the following requirements:

.1 Comprise an automatic charger, complying with requirements set out in SOLAS regulation IV/13.

.2 Comprise rechargeable accumulator batteries, complying with the guidelines regarding automatic chargers.

.3 Provisions should be made for an aural alarm and visual indication at the position from which the ship is normally navigated, indicating any failure in the UPS which is not monitored by the alarm and indicators required by the guidelines regarding automatic chargers.

. The UPS should be operational within 5 seconds of switching on.

.5 The UPS should be so designed and constructed that it is protected against damage resulting from disconnecting the batteries or, with the battery disconnected, short-circuiting the UPS battery connections. If this protection is provided by electronic means it should automatically reset following removal of the open or short-circuit conditions.

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Note: - If the UPS does not fulfil the requirements in accordance with SOLAS regulation IV/13 and IMO resolution A.702(17), two separate UPS systems should be installed; one for the basic radio equipment and one for the duplicated equipment.

The capacity of batteries used in UPS systems is normally stated at a discharge time of 10 hours. When discharging such batteries at shorter time, i.e. 1 hour in accordance with the GMDSS requirements, it will only be possible to utilize approx. 60% of the battery capacity. It is therefore recommended to dimension such batteries to be one and a half times larger than the total load.

7.7 Automatic battery chargers

Automatic chargers for radio batteries should meet the general requirements set out in regulation IV/13 of SOLAS 197 , as amended, and IMO resolution A.69 (17) and should also comply with the following requirements:

.1 The charger should be capable of recharging the completely discharged accumulator batteries to the minimum required capacity within 10 hours.

.2 The charger should be capable of keeping the batteries appropriately charged as prescribed by the manufacturer for permanent charging.

.3 The supplied voltage and current should always be within the tolerance limits prescribed by the battery manufacturer, taking into account the environmental temperature of the battery, likely to be experienced in ship. A protection should be provided against over charging or discharging of batteries from a possible fault in the charger.

. The automatic charger should be provided with a visual indication that it is switched on. An indication of the battery voltage and charge/discharge current should be available on the navigation bridge.

.5 Provisions should be made for an aural alarm and visual indication at the position from which the ship is normally navigated, indicating when the charging voltage or current is outside the limits given by the manufacturer. It should not be possible to disable this alarm and indication and it should only be possible to acknowledge and silence the alarm manually. Both the alarm condition and indication should reset automatically when normal charging condition has been restored. Failure of the alarm system should not interrupt the charging or discharging of batteries.

.6 The automatic charger should be operational within 5 seconds of switching on or after a power supply interruption.

.7 The automatic charger should be so designed and constructed that it is protected against damage resulting from disconnection the batteries or, with the battery disconnected, short-circuiting the battery connection. If this protection is provided by electronic means it should automatically reset following removal of the open or short-circuit conditions.

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Note: - As said in subsection 7.1 above, it is not advisable to provide the main source of energy to the GMDSS equipment through the battery charger. However, if the battery charger is used to supply parts of the GMDSS installation directly, i.e. the MF/HF transceiver, the capacity of the charger should be dimensioned for simultaneous supply of connected equipment and maintaining a sufficient charging of the batteries in accordance with SOLAS 197 , as amended, regulation IV/13.2.

7.8 Protection of circuits for accumulator batteries

.1 Battery circuits (i.e. the cables from battery case/room) should be protected against short-circuit and overload. The protection device is to be installed as near as possible to the batteries.

.2 When conductors from the batteries are not protected against short-circuit and overload, they are to be installed so as to be proof against short circuit and earth faults. The requirements for short-circuit protection also apply to charge current circuits.

Note: - For certain applications it may be necessary to establish measures which may conflict with these requirements. As an example, screening of battery cables can be required to avoid electro-magnetic interference, e.g. by using single-core insulated cables without screening installed in separate metal pipes which are properly earthed. Special measures should then be established to reduce the possibility of mechanical damage to the cables.

Equivalent solutions may be accepted, e.g. by using double-screened cables in the battery room with explosion-proof fuses. The inner screen should be treated according to Ex-rules, but the outer screen can be treated according to what is necessary to achieve good EMC-screening. The outer screen can e.g. be earthed at both ends to protect against High Frequency EMC-fields.

8 CABLING AND WIRING

.1 The cabling and wiring in the radio installation should be designed so as to prevent electrical interference to radio and navigational equipment.

.2 Cables should have the correct dimension to prevent voltage reduction to radio equipment when full load. The voltage reduction in copper conductors is calculated as follows: Voltage drop = 0,035 x length (m) x total load (A) divided by the cross section in squared mm.

.3 In order to reduce interference it is essential to have good separation between signal cables and those cables carrying higher voltages.

. All cabling and wiring should be of a type approved and suitable for use on board ships.

8.1 Battery circuits – fuses and breakers

.1 Each radio system should have separate fuses for both AC and DC voltages to which it is connected. AC and DC fuse boards should be located on the bridge or in close proximity to the bridge.

.2 A single fault in one of the power units should not affect both the basic and duplicated radio equipment.

.3 All fuses and breakers should be clearly marked and labelled to clearly indicate which equipment is being protected.

Note: - A VHF with DSC, a MF/HF DSC transceiver, a NBDP with printer and Inmarsat equipment with a VDU and printer are each considered as a radio system .

9 Installation of GMDSS radio equipment on board mobile offshore drilling units (MODUs)

Mobile offshore drilling units should, fulfil the GMDSS requirements laid down IMO's MODU Code, as revised in 1991. This revision introduced provisions based on the GMDSS requirements. All GMDSS requirements should, as a general rule, be fulfilled. However, for drilling units the requirement for duplication may be considered as fulfilled if the radio installation complies with regulation 11.5.2 of the MODU Code as follows:

.1 Each unit while stationary at the site, including when engaged in drilling operations, should comply with all requirements prescribed in chapter IV of the SOLAS Convention, 197 , as amended, that are applicable to ship sailing trough the same area.

.2 Taking into account the different types of accident which may occur on the MODU, additional radio equipment should be installed in a room or position, which could be the bridge or emergency control room, situated as far as practical from the radio equipment fitted in compliance with section 11.5.1, so that a single accident in any part of the MODU could deprive the MODU of all facilities for radiocommunications.

.3 The additional radio equipment should comply with the following regulations of the 1988 SOLAS amendment for MODUs drilling in:

.1 sea area A1, the equipment prescribed in regulation IV/7.1.1;

.2 sea area A2, the equipment prescribed by regulations IV/7.1.1 and IV/9.1.1;

.3 sea area A3, the equipment prescribed by regulations IV/7.1.1 and IV/10.1.1, plus 10.2; or alternatively, as required by regulations IV/7.1.1 and 10.2.1; and

. sea area A , the equipment prescribed by regulations IV/7.1.1 and IV/10.2.1.

. If the acoustic noise level in a room fitted with operating controls for radio equipment is so high or could be so high, during particular operating conditions, that it may disturb or prevent proper use of the radio equipment, adequate noise protection should be provided by mechanical or other means, in association with the operating controls for the radio equipment.

Note: - All requirements of chapter IV of the 1988 SOLAS amendments referring to from the position the ship is normally navigated should be applied as meaning from a position (or from the positions), which is continuously manned and which is controlling the MODU. Watchkeeping on DSC and other emergency and calling channels should be kept from a position which is continuously manned. Watchkeeping and the operation of all radio equipment which are required on board should be carried out by a person holding a GOC/GMDSS or ROC/GMDSS (if only A1 installation) radio operator certificate.