



INSTRUCTIONS FOR THE GUIDANCE OF SURVEYORS ON

RADIO INSTALLAIONS

MSIS27 CHAPTER 12

Rev 11.22



PREFACE

- 0.1 These Marine Survey Instructions for the Guidance of Surveyors (MSIS) are not legal requirements in themselves. They may refer to statutory requirements elsewhere. They do represent the MCA policy for MCA surveyors to follow.
- 0.2 If for reasons of practicality, for instance, these cannot be followed then the surveyor must seek at least an equivalent arrangement, based on information from the owner/operator. Whenever possible guidance should be sought from either Principal Consultant Surveyors or Survey Operation Branch, in order to maintain consistency between Marine Offices.

Technical Services Ship Standards
Bay 2/22, Spring Place
105 Commercial Road
Southampton
SO15 1EG

Recent Amendments

The amendments made in the most recent publication are shown below, amendments made in previous publications are shown in the document Amendment History.

Version Number	Status / Change	Date	Author Reviewer	Content Approver	Next Review Date/Expiry Date
02.21	<ul style="list-style-type: none"> Update to Radar transponders section Amended section numbering 	19/01/21	I Platts/D Fenner	G Stone	19/01/23
03.21	<ul style="list-style-type: none"> Update with guidance on Iridium GMDSS on vessels 	02/03/21	D Fenner	G stone	19/1/23
09.21	<ul style="list-style-type: none"> Update to references to MSN1871 Amendment No2 	30/06/21	D Fenner/I Platts	G Stone	06/09/23
11.22	<ul style="list-style-type: none"> Clarify that surveyors should ensure Authority to Operate on Radio Certificates covers the equipment on board 	2/11/22	D Fenner	G Stone	01/11/25

MAIN CONTENTS

PREFACE	2
RECENT AMENDMENTS	3
MAIN CONTENTS	4
12.1 GENERAL	5
12.2 SURVEY ARRANGEMENTS	12
12.3 GUIDELINES FOR SURVEY	13
12.4. FUNCTIONAL REQUIREMENTS	20
12.5 BASIC EQUIPMENT	22
12.6 GMDSS RADIO EQUIPMENT	27
12.7 ANTENNA INSTALLATION	35
12.8 EMC, EARTHING AND SCREENING	39
12.9 SOURCES OF ENERGY	41
DOCUMENT AMENDMENT HISTORY	51

12.1 GENERAL

12.1.1 These Instructions are issued by the Maritime and Coastguard Agency for the guidance of radio surveyors in the survey and inspection of radio installations on fishing vessels for the purpose of ensuring compliance with the various Statutory Instruments. They also indicate to owners, skippers and crew, shipbuilders and radio installation companies the procedure adopted for the survey and acceptance of radio installations.

12.1.2 The relevant regulations and requirements are set out at the beginning of each section. The guidance should also be applied, as far as practical.

12.1.1 STATUTORY PROVISIONS

12.1.1.1 The principal statutory provisions concerning radio installations are contained in:

- [The Merchant Shipping Act 1995](#);
- [The Wireless Telegraphy Act 2006](#);
- [The Merchant Shipping \(EPIRB Registration\) Regulations 2000 \(SI No. 1850\)](#);
- [The Merchant Shipping \(Radio\) \(Fishing Vessels\) Regulations 1999 \(SI No. 3210\)](#) (referred in this Chapter as the “Radio Regulations”);
- [The Fishing Vessels \(Codes of Practice\) Regulations 2017 \(SI No. 943\)](#)

12.1.1.2 A comprehensive list of current Merchant Shipping Acts and Regulations is issued at regular intervals and published by the MCA in the form of a Marine Guidance Note. They can be downloaded from the MCA website: www.mcga.gov.uk

12.1.2 DEFINITIONS

12.1.2.1 In these instructions the following definitions apply:

12.1.2.2 Authorised Persons

An organisation authorised or recognised by the Secretary of State to perform the survey of radio equipment on United Kingdom ships and, as appropriate, issue approval certification.

12.1.2.3 Authority To Operate (ATO)

Issued by the MCA, to authorise a radio certificate holder to operate a UK licensed radio station.

12.1.2.4 Basic Equipment

Equipment forming part of the radio installations provided on a fishing vessel to comply with Regulation 10 and Regulations 11,12,13,14 and schedule 4, as appropriate, of the [Radio Regulations](#).

12.1.2.5 Directive Vessel

A fishing vessel which is new and over 24m **Registered Length**, or existing and over 45m **Registered Length**, where new means built on or after 1 January 1999.

12.1.2.6 DSC

Digital Selective Calling being a technique using digital codes which enables a radio station to contact other stations.

12.1.2.7 Duplicate Equipment

Equipment, additional to basic equipment, forming part of radio installations provided on a fishing vessel.

12.1.2.8 Emergency Position-Indicating Radio Beacon (EPIRB)

A station in the mobile service, the emissions of which are intended to facilitate search and rescue operations.

12.1.2.9 Existing Installation

An installation wholly installed on board before the date on which the present Regulations enter into force irrespective of the date on which acceptance by the respective Administration takes effect; or,

An installation part of which was installed on board before the date of entry into force of the present Regulations and the rest of which consists either of parts installed in replacement of identical parts, or parts which comply with the requirements of this chapter.

12.1.2.10 Float Charging

A battery-charging arrangement where a battery, and all equipment connected to the battery, are simultaneously supplied with electrical energy from an automatic charging device.

12.1.2.11 Functional Requirements

The functional requirements of the GMDSS as specified in regulation 8 of the [radio Regulations](#).

12.1.2.12 GMDSS

The Global Maritime Distress and Safety System.

12.1.2.13 HF

The radio frequencies between 4 and 30 MHz allocated by the ITU to the maritime mobile services.

12.1.2.14 IFVC

International Fishing Vessel Certificate, issued in accordance with the Torremolinos Protocol for all fishing vessels 24m **Registered Length** and above, **EC Directive 97/70 and issued in accordance with the Code of Safe Operation of Fishing Vessels of 24m Registered Length and Over (MSN 1873).**

12.1.2.15 IMO

International Maritime Organization

4, Albert Embankment

London

SE1 7SR

12.1.2.16 INMARSAT

The Organisation established by the Convention of the International Maritime Satellite Organisation (INMARSAT) adopted on 3 September 1976.

12.1.2.17 International NAVTEX Service

The co-ordinated broadcast and automatic reception on 518 kHz of maritime safety information by means of narrow-band direct-printing telegraphy using the English language.

12.1.2.18 ITU

International Telecommunication Union.

12.1.2.19 Maritime Safety Information

Navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages broadcast to ships.

12.1.2.20 MF

The radio frequencies less than 4 MHz allocated by the ITU to the maritime mobile services.

12.1.2.21 New Installation

Any installation which is not an existing installation.

12.1.2.22 Non Directive Vessel

A fishing vessel over **15m Length Overall** which is new but less than 24m **Registered Length**, or existing but less than 45m **Registered Length**, where new means built on or after 01 January 1999.

12.1.2.23 Radio Operator

A person holding a certificate specified in the Radio Regulations (ITU) as appropriate.

12.1.2.24 Radio Regulations (ITU)

The Radio Regulations annexed to, or regarded as being annexed to, the most recent International Telecommunication Convention which may be in force at any time.

12.1.2.25 Radio Regulations

Unless otherwise specified, [the Merchant Shipping \(Radio\) \(Fishing Vessels\) Regulations 1999, SI No. 3210](#), as may be amended from time to time.

12.1.2.26 Regulations

Collectively or individually, those Regulations regarding radio matters that are applicable to the vessel involved.

12.1.2.27 UKFVC

United Kingdom Fishing Vessel Certificate, issued in accordance with the Code of Safe Working Practice ([MSN 1872](#)) for fishing vessels between [15m Length Overall and 24m Registered Length](#).

12.1.2.28 VHF

The radio frequencies between 30 MHz and 300 MHz.

12.1.3 **APPLICATION OF THE RADIO INSTALLATIONS REGULATIONS**

12.1.3.1 The [Radio Regulations](#) apply to:

- Sea-going United Kingdom fishing vessels.
- Other seagoing Directive fishing vessels while they are in the United Kingdom or the territorial waters thereof.

12.1.3.2 At sea means any time when a fishing vessel is not securely moored in a safe berth.

12.1.4 **RECOMMENDED GUIDANCE**

12.1.4.1 Recommended guidance concerning radio installations for fishing vessels are contained in:

- Admiralty List of Radio Signals GMDSS – NP285, vol 5;
- Code of Safe Working Practices for Merchant Seamen;
- The IEE Regulations for the Electrical Equipment of Ships;
- Merchant Shipping Notices;

- Marine Guidance Notices;
- Marine Information Notes;
- British Standard Specification for Limits and methods electromagnetic interference generated by marine equipment and installations. (BS 1597); and
- Code of practice for radio interference suppression on marine installations (BS 5260)

12.1.5 POWERS OF SURVEYORS

- 12.1.5.1 Powers of surveyors are derived from [The Merchant Shipping Act 1995](#) (Section 256).
- 12.1.5.2 Sections 257, 258 and 259 provide the powers to require the production of ship's documents, to inspect ships and their equipment, and to board ships at any reasonable time for the purpose of checking compliance with statutory requirements.
- 12.1.5.3 A Radio Surveyor appointed by the Secretary of State for Transport may under Sections 256 of [The Merchant Shipping act 1995](#), inspect a vessel and, where appropriate, confirm that it is properly provided with radio installations and satisfies the other requirements in conformity with the Regulations.
- 12.1.5.4 A Radio Surveyor, whilst undertaking work on behalf of the Maritime and Coastguard Agency shall not:
- offer comments concerning individual suppliers of marine radio equipment or their capabilities in respect of repairs nor be personally involved in any repairs which may need to be carried out in connection with that survey;
 - undertake any sales activity whatsoever, whether at a regional office or main office, in connection with any survey or inspection performed;
 - pass any information whatsoever regarding a potential sale or sales connected with any survey or inspection performed, to any third party (except the MCA for monitoring purposes) or to any person or department within the surveyor's parent company.

12.1.6 DETENTION

- 12.1.6.1 Section 95 of [The Merchant Shipping Act 1995](#) as amended provides for the detention of an unsafe ship. Guidance on detention is contained in procedure MCA 810 and the Instructions to Surveyors on Inspection Policy.
- 12.1.6.2 In cases where a ship to which the Regulations apply, does not comply with the relevant Regulations, the ship may be liable to be detained. In the event of a ship not complying with the Regulations, the Radio Surveyor must consult with the local MCA **Consultant** Fishing Vessel Surveyor who will determine whether the vessel should be detained and what further action should be taken against the vessel.

12.1.7 IMPROVEMENT AND PROHIBITION NOTICES

12.1.7.1 Improvement and Prohibition Notices should be issued in accordance with procedure MCA 860 and the Instructions to Surveyors on Inspection Policy (MSIS 38).

12.1.7.2 Detention is effective if the ship is about to go to sea, and is mainly used to prevent departure of a ship until defects affecting her safety have been remedied. It is not appropriate for stopping unsafe practices or preventing dangerous activities in port, and in some cases it is too severe a course of action to deal with some infringements of statutory requirements. An alternative course of action is available under [The Merchant Shipping Act 1995](#), which allows the serving of Improvement and Prohibition Notices. ~~These should be issued in accordance with procedure MCA 860 and the Instructions to Surveyors on Inspection Policy (MSIS 38).~~

Non-United Kingdom Ships

12.1.7.2 In general, United Kingdom Regulations require standards on non-United Kingdom ships to be equivalent to those on United Kingdom ships and make provisions for measures to be taken to rectify any deficiencies or, in extreme cases, for ships to be detained. Where an activity involves a risk of serious injury or pollution a Prohibition Notice can be issued to a non-United Kingdom ship provided the activity involved is one to which relevant Statutory Instruments apply. However, an Improvement Notice can be issued only where there is a breach of specific regulation and the surveyor should first satisfy himself that the regulation involved does in fact apply to non-United Kingdom ships.

12.1.8 REFERRAL TO MARITIME AND COASTGUARD AGENCY

12.1.8.1 Should a difficulty arise in an area covered by the Regulations, Merchant Shipping Notices, Marine Guidance Notices or these Instructions the matter should be referred to the:

Maritime and Coastguard Agency

Navigation Safety Branch

Spring Place 105 Commercial Road

Southampton SO15 1EG

Tel: +44 (0) 020381 72432

E-mail: navigationsafety@mcga.gov.uk

12.1.9 EXEMPTIONS

12.1.9.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

- 12.1.9.2 Exemptions are to be considered following procedure MCA 292 and the Survey Policy Instructions.
- 12.1.9.3 The Secretary of State for Transport is empowered to exempt any fishing vessel from any of the requirements of the [Radio Regulations](#). Applications for exemption may be sent by the owners or their representatives directly to the Maritime and Coastguard Agency's Navigation Safety Branch, or through the Regional **Consultant** Fishing Vessel Surveyor. Any such application should contain detailed reasons for regarding the statutory requirements as unnecessary or unreasonable.

Issue of Exemption Certificate

- 12.1.9.3 If complete, partial or conditional exemption is granted by the MCA, an exemption certificate will be issued to the applicant stating the extent of the exemption, and where appropriate, the conditions upon which it has been granted. Exemption certificates will normally remain in force for the same period as any certificate relating to the radio installation. A copy of any exemption certificate shall be retained aboard the vessel to which it is granted and must be made available to a Radio Surveyor or MCA Surveyor at any survey or inspection of the radio station.

Non - UK Registered Ships

- 12.1.9.4 Where a vessel, not registered in the United Kingdom, holds an exemption certificate, the Radio Surveyor or MCA Surveyor should check that the exemption falls within the terms of the Directive or, in the case of a non Directive vessel, would be considered reasonable applied to a UK vessel. Where there is reason to doubt the acceptability of the exemption, the matter should be referred to Navigation Safety Branch.

12.1.10.1 FEES

- 12.1.10.1 Fees are set by the individual Authorised Person to carry out Radio Surveys. Vessel owners should liaise directly with these bodies regarding the fees.

12.1.11 SAFETY

- 12.1.11.1 To confirm that personnel are not placed at risk or equipment is not inadvertently damaged during survey, a responsible person representing the owners, capable of operating the equipment should be present during survey or other inspection of radio installations. If the owner is not so represented the Surveyor should not proceed unless he is satisfied that it is safe to do so and has the agreement of the master or representative of the owner.

12.2 SURVEY ARRANGEMENTS

12.2.1 APPLICATION FOR RADIO SURVEY

12.2.1.1 Application for a survey should be made directly by the Owner to the Authorised Person and not through class. A list of Authorised Persons is available at

<https://www.gov.uk/government/publications/list-of-authorised-persons-for-radio-surveys>

12.2.1.2 The Authorised Persons are permitted by MCA to conduct the surveys and inspections of radio installations on UK registered ships and non-UK registered ships in UK ports. The Authorised Person is required to take full legal responsibility for the actions of the radio surveyors supplied.

12.2.1.3 In any application for an initial survey clear instructions should be given regarding the GMDSS sea area or areas through which the ship will pass during its intended voyages.

12.2.1.4 Where any change to the equipment and other items covered by the survey is to be made or has been made prior to a renewal survey, or where it is intended to amend the area of operation on the certificate, this information should be brought to the attention of the Authorised Person at the time of application.

12.2.1.5 Radio surveyors may be required, as necessary, to perform a survey of the radio installations on a UK registered ship overseas. Initial and renewal surveys of UK registered fishing vessels are to be performed by radio surveyors from the Authorised Person. Annual radio surveys may be conducted locally in foreign ports by delegated appointment to classification or other authorised sub-contractors. Radio surveyors performing surveys for statutory purposes should confirm that all the equipment required under the Regulations is carried and is fit and ready for use, that the installation is in accordance with the Regulations and instructions and that all radio operators are appropriately qualified.

12.2.2 SUBMISSION OF DRAWINGS (PLANS & DESIGNS)

12.2.2.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

12.2.2.2 Shipowners and shipbuilders should submit plans and particulars of the proposed radio installations for new fishing vessels to the regional [Consultant Fishing Vessel Surveyor](#) who will consult with the Authorised Person agreed between the Owner and MCA concerning the surveys of radio installations at the design stage. This will provide an early opportunity to determine, as far as possible, whether the proposals comply with the Regulations; they should cover the layout of equipment, wiring and antenna arrangements. These plans will be treated in confidence.

12.2.3 ISSUE OF CERTIFICATES

12.2.3.1 If entirely satisfied that the applicable Regulations are being met and all fees due have been paid, the radio surveyor should complete and forward a Report of Radio Survey MSF 1808 with Record of Equipment MSF 1809 to the MCA Lead Surveyor for use in connection with the issue of a FV Certificate.

12.2.4 DEFICIENT INSTALLATIONS

12.2.4.1 When a Radio Surveyor considers an installation deficient or defective, a notice in writing (MSF 1603) is to be handed or sent to the owner or his representative pointing out the defect or deficiency and indicating what is required to remedy it. All defects and deficiencies must be made good to the satisfaction of the Radio Surveyor.

12.2.4.2 If defects are sufficiently serious that a completed Report of Survey (MSF 1808) cannot be issued, or if it should be considered necessary to invoke further enforcement action, the local Regional **Consultant Fishing Vessel** Surveyor must be informed as per 12.1.6 or .7.

12.3 GUIDELINES FOR SURVEY

12.3.1 EQUIPMENT STANDARDS

12.3.1.1 Requirements are contained in the [MSN 1864](#) and [MSN 1867](#).

12.3.1.2 Radio equipment installed on a UK fishing vessel over **15m Length Overall** should meet the relevant IMO GMDSS requirements and ITU recommendations and should be of a type approved by the administration.

12.3.1.3 However, non-directive vessels may continue to comply with the performance standards listed in [MSN 1809](#), as may be amended.

12.3.1.4 These guidelines reflect to a large extent unambiguous requirements in accordance with the relevant rules and Regulations, see subsection 12.3.2. below. Practical installation solutions other than the ones emerging from these guidelines may be accepted as long as the IMO requirements 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.

12.3.2 RULES AND REGULATIONS

12.3.2.1 These guidelines are prepared in accordance with the following conventions, regulations, instructions and guidelines:

- IMO Resolutions (Performance standards) and IMO Circulars;
- ITU (International Telecommunication Union) Radio Regulations (RR); and
- International Standards – ISO 8468 1990 (E), annex A

12.3.3 DRAWINGS (PLANS AND DESIGNS)

12.3.3.1 For the radio installations, including those used in lifesaving appliances, the examination of plans and designs should consist of establishing:

- the sea areas declared for operation;
- the equipment installed to fulfil the functional requirements for the sea areas;
- the methods used to confirm the availability of the functional requirements; and
- the arrangements for supply of an emergency source of energy (if any).

12.3.3.2 Declarations are required from the owner, the owner's representative or the shipyard as appropriate relating to the following:

- The sea area or sea areas through which the ship will operate;
- The radio installations which are intended to fulfil the functional requirements;
- The method or methods adopted to ensure the radio equipment required by the Regulations complies with the serviceability and maintenance requirements of the Regulations; and
- The availability, or otherwise, of an emergency source to supply the radio installations.

General

12.3.3.3 Specified drawings should be available well before the work on a new building or reconstruction of a vessel is started. Insufficient or missing drawings may result in deficiencies during radio survey and could lead to expensive repairs costs later.

12.3.3.4 For the radio installation the following drawings should be prepared:

- Antenna drawing;
- Radio arrangement drawing; and
- Wiring diagram.

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

12.3.3.6 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.

Antenna drawings

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

- All transmitting antennae including location of antenna tuner;
- All receiving antennae including GNSS antennae;
- Radar antennae;
- Satellite communication antennae;
- The location of float-free EPIRBs; and
- AIS antennae

12.3.3.8 When changes are made in the antenna arrangement, modified antenna drawings should be prepared and submitted to the Authorised Person for approval.

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

12.3.3.9 These drawings should show the location of the following equipment:

- Controllers for transmitting distress alerts;
- VHF radio installations, including any control units;
- MF or MF/HF installation, including any control units, printers etc;
- Satellite communication equipment, including terminals, printers etc;
- Watchkeeping receivers for VHF ch. 70, 2187.5 kHz, and HF distress channels in 4, 6, 8, 12 and 16 MHz bands;
- NAVTEX and EGC receivers;
- Radar transponders and EPIRBs (if located on the navigating bridge deck);
- Hand held (two-way) GMDSS VHF transceivers and their chargers;
- Emergency light powered from a reserve source of energy to illuminate the mandatory radio equipment;
- Battery charger (for the reserve source of energy); and
- Fuse box.
- Wiring diagram

12.3.3.10 These drawings should show the following connections etc.:

- Antenna connections;
- Connections to telephone exchange (PABX), fax machine etc;
- 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;
- Fuses for all radio equipment;

- Uninterruptible 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 switchover connections to alternative power supplies, by-pass switch etc.);
- Any connections (interface connections) between satellite navigator/ GNSS and GMDSS radio equipment;
- Battery chargers for the reserve source of energy;
- Connections to gyro (if applicable);
- Type of cables used in the installation; and
- Connections to VDR (if applicable)

12.3.4 INSTRUCTION MANUALS AND PUBLICATIONS

12.3.4.1 The following up to date instruction manuals and publications should be available on board:

- User manual (in English) for all radio equipment and battery chargers;
- Specifications and battery capacity calculations for the installed batteries;
- ITU publications according to requirements in the [Radio Regulations](#);
- Publications as required by UK flag authorities; Admiralty List of Radio Signals (NP285); Lists of Coast and Ship stations;
- The GMDSS Radio Log Book. For non-Directive vessels, a Simplified FV Radio Log should be kept; and
- A Certificate of Competency for a radio operator (see para 12.3.11) and an ATO
- Shore Based Maintenance agreement (if appropriate)

12.3.5 TOOLS AND SPARE PARTS

12.3.5.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

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

- Spare fuses for all radio equipment, battery circuit and main fuses where safety fuses (“melting” fuses) are used;
- Reserve emergency lamps;
- Tools necessary for simple servicing;
- Acid specific density meter if the ship is fitted with lead acid accumulators; and
- Multi-meter.

12.3.5.3 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.

12.3.6 MAINTENANCE REQUIREMENTS

12.3.6.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

12.3.6.2 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.

12.3.6.3 Every Directive fishing vessel shall ensure availability of equipment by using at least one of the following methods ([MSN 1801](#) refers):

- duplication of equipment;
- shore-based maintenance; and
- at-sea electronic maintenance capability.

Duplication of equipment

12.3.6.4 The following additional equipment should be installed in sea areas A3 and A4:

- VHF with DSC controller;
- Approved satellite ship earth station or complete MF/HF radio telephony station with DSC and NBDP. (See note)

(IMO Resolution A.702(17))

Note: - Ships in the A3 sea areas may choose between duplication with either complete MF/HF transceiver or approved satellite ship earth station. Ships in regular trade in sea areas A4 must duplicate with a complete MF/HF installation. Ships in sea area A4 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.

Shore-based maintenance

12.3.6.5 To be acceptable:

- The shipping company/ship must 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. Maintenance contracts must comply with [MGN 417](#).

(IMO Resolution A.702(17), Annex, item. 3)

- A Fishing Vessel Certificate issued by an Administration should, in general, be a sufficient proof that satisfied adequate maintenance arrangement has been made.

(IMO Resolution, A.702(17) and Com/circ. 117)

At-sea electronic maintenance

12.3.6.6 If the shipowner chooses at sea electronic maintenance, personnel with necessary qualifications and authorisation for servicing the equipment must be present on board. All necessary instruments and spare parts for repair of all radio equipment must also be available when the ship is at sea. In the case of United Kingdom ships, for the purpose of the Regulations an officer or crew member shall be deemed qualified to carry out radio maintenance if he or she holds –

- a Radio Maintenance Certificate granted by the Secretary of State; or
- a certificate recognised by the MCA as being equivalent to the certificate in (i) above.

(IMO Resolution. A.702(17))

12.3.7 SHIP STATION RADIO LICENCE

12.3.7.1 A ship station radio licence in accordance with the [Radio Regulations](#) should be issued to the ship.

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

(RR. Art. 18)

12.3.7.3 Applications should be made directly to the **Spectrum Licencing** Centre:

<http://licensing.ofcom.org.uk/radiocommunication-licences/ships-radio/>

Tel: 020 7981 3181 or 0300 123 1000

Fax: 020 7981 3235

Textphone: 020 7981 3043 or 0300 123 2024 – Please note these numbers will only work with special equipment used by people who are deaf or hard of hearing

Email: spectrum.licensing@ofcom.org.uk

Note: - The Maritime Mobile Service Identity (MMSI) number stipulated in the radio licence should be coded into the DSC equipment.

12.3.7.4 If a satellite EPIRB is fitted **or Personal Locator Beacon** carried then it must be coded and registered, see [MSN 1816](#). The UK can only accept beacons coded using MID codes 232 233 234 or 235. Accepted UK protocols are:

- UK serialised – where the beacon has a unique serial number;
- UK Maritime Mobile Service Indicator (MMSI) – allocated to the vessel; and
- UK location protocols – for GPS models.

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

- 12.3.7.6 UK **Beacon** registry is at MRCC Falmouth:
Tel. +44 1326 211 569 fax +44 1326 319264

Guidance on UK **Beacon** registration is contained in [MSN 1816](#).

12.3.8 APPLICATION FOR ACTIVATION OF SATELLITE EQUIPMENT

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

12.3.9 DE-ACTIVATION OF SATELLITE EQUIPMENT WHEN TRANSFERRING A SHIP TO FOREIGN FLAG

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

12.3.10 INITIAL AND ANNUAL RADIO SURVEY, ISSUANCE, RENEWAL AND ENDORSEMENT OF FISHING VESSEL CERTIFICATES (FVC)

- 12.3.10.1 Guidance on survey of radio installation is given in IMO Res.A.948(23), noting the following text in this Resolution.

"The radio survey should always be performed by a fully qualified radio surveyor who has adequate knowledge of the IMO's relevant Convention, 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."

- 12.3.10.2 MCA has permitted a number of Authorised Persons to undertake radio surveys on fishing vessels in UK and abroad. Their report is required for the MCA surveyor to issue a UKFVC or IFVC, so the surveyor must undertake radio surveys during initial and renewal MCA surveys.

12.3.11 RADIO OPERATORS

- 12.3.11.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

- 12.3.11.2 It is considered as very important that the responsible radio operators are properly instructed and trained in how to use the GMDSS radio equipment.

- 12.3.11.3 For Directive vessels, a GMDSS restricted operator's certificate (ROC) is required for operation in sea area A1, and a general operator's certificate (GOC) is required for operation in sea areas A2/A3/A4. UK certificates of competency include an authority to operate (ATO). Foreign certificate holders without certificates of equivalent competency (CEC) are required to apply to MCA for an ATO.

- 12.3.11.4 The radio licence and certificate for the radio operator(s), including ATO, should be checked during the survey. New Certificates of Competency (CoC) and Certificates of Equivalent Competency (CEC) will include the ATO. Older CoCs and foreigners without a CEC, should have a separate ATO.
- 12.3.11.5 On United Kingdom non-Directive vessels a GMDSS Short Range Certificate (SRC) can be accepted for operation in A1 area, and GMDSS Long Range Certificate (LRC) for operations in A1, A2, A3 or A4 areas.
- 12.3.11.6 Surveyors should ensure that the ATO refers to the equipment on board, for example, where a vessel has DSC capability, then the operators Certificate shall state that the person to whom it is issued as the authority to operate DSC equipment.

12.4. FUNCTIONAL REQUIREMENTS

12.4.1 GENERAL

- 12.4.1.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).
- 12.4.1.2 The functional requirement of the GMDSS 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.
- 12.4.1.3 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 remote activated from the bridge.
- 12.4.1.4 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.
- 12.4.1.5 All ships should keep continuous watch on VHF channel 70 by use of a DSC receiver.
- 12.4.1.6 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.
- 12.4.1.7 IMO Resolution MSC.131(75) requires all vessels 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.

- 12.4.1.8 Except for area A1, 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.

12.4.2 SEA AREAS (DEFINITIONS)

12.4.2.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

- 12.4.2.2 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.

- 12.4.2.3 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.

- 12.4.2.4 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).

- 12.4.2.5 A4 means an area outside sea areas A1, A2 and A3.

12.4.3 GMDSS EQUIPMENT REQUIREMENTS FOR DIRECTIVE VESSELS

Equipment	A1	A2	A3 Inmarsat solution	A3 HF Solution	A4
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 ¹	x ¹		X	x
Float-free satellite EPIRB	x	x	x	X	x ⁴

Radar transponder (SART)	x ²	x ²	x ²	x ²	x ²
Hand held GMDSS VHF transceivers	x ³	x ³	x ³	x ³	x ³

- 1) Outside NAVTEX coverage area.
- 2) New vessels 24m Registered Length - 45m Registered Length & existing vessels over 45m Registered Length: 1 set
New vessels over 45m Registered Length: 2 sets
- 3) New vessels 24m Registered Length - 45m Registered Length & existing vessels over 45m Registered Length: 2 sets
New vessels over 45m Registered Length: 3 sets
- 4) Inmarsat E-EPIRB cannot be utilised in sea area A4.

12.4.3.1 Refer to section 12.11 for GMDSS equipment for non-Directive vessels.

12.4.3.2 The International Maritime Organization (IMO) has recognised Iridium as meeting the necessary technical criteria of a GMDSS Satellite Service. Iridium has a public Service Agreement (PSA) with the International Mobile Satellite Organisation (IMSO) for GMDSS Satellite Services.

12.4.3.3 Use of Iridium GMDSS Satellite Services needs an appropriate Iridium GMDSS Satellite Services terminal.

12.4.3.4 The service has been launched but the Maritime Safety Information (MSI) Services may only be relied upon for safety purposes when declared fully operational by the information provider, that is the NAVAREA or METAREA coordinator. This information will be published by IMO in GISIS or in the interim in a circular where the area service will be declared 'operational'.

12.4.3.5 Where the Iridium MSI service is not fully operational, an Iridium GMDSS terminal is not an equivalent for regulatory compliance to an Inmarsat GMDSS terminal capable of receiving MSI via SafetyNet.

12.5 BASIC EQUIPMENT

12.5.1 GENERAL REQUIREMENTS

12.5.1.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

12.5.1.2 Every radio installation should:

- be so located that no harmful interference of mechanical, electrical or other origin affects its proper use;
- be so located as to ensure electromagnetic compatibility (EMC) and avoid harmful interference to other equipment and systems;
- 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;

- be provided with emergency lighting, which is independent of the main and emergency sources of electrical power for the illumination of the radio controls;
- be clearly marked with the ships call sign, MMSI number and other identities as appropriate; and
- be so located that no magnetic compass lies within the stated Compass Safe Distance of the equipment. Where no such marking exists, it should be sited at a distance of more than 700mm away. Radio equipment spares should be stowed more than 1m from a magnetic compass.

12.5.2 NAVIGATIONAL SAFETY VHF

- 12.5.2.1 Control of the VHF used for navigational safety must be available at the conning position (in the front of the navigation bridge), and where necessary, from the wings of the bridge.
- 12.5.2.2 Portable VHF equipment may be used to provide navigational safety from the wings of the bridge.

12.5.3 MARKING OF RADIO EQUIPMENT AND NOTICES

- 12.5.3.1 All radio equipment should be duly marked with type designation. The marking should be clearly visible when the equipment has been installed.
- 12.5.3.2 The radio installation should be duly marked with the ship's call sign, the ships station identity and other codes applicable for the use of the radio equipment.
- 12.5.3.3 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.
- 12.5.3.4 "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.

12.5.4 EMERGENCY LIGHTS

- 12.5.4.1 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 preferably be red and give adequate illumination of the controls for safe operation of the radio equipment, and the working table for reading and writing.
- 12.5.4.2 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.
- 12.5.4.3 For VHF transceivers located openly in the front of the bridge, a screened light concentrating on each single piece of equipment, should be 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 VHF transceivers and the DSC controllers.

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

(IMO Resolution A.694(17), item 3.3.)

12.5.4.5 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.

12.5.4.6 Switches for emergency lights must be properly marked.

12.5.5 RECOMMENDED INSTALLATION

12.5.5.1 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 emphasised, however, that the suggestions in subsections 12.5.6 – 12.5.8 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.

(COM/Circ. 105 and ISO 8468: 1990(E))

12.5.6 RADIO WORK STATION

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

12.5.6.2 When the workstation is being used during night time, a curtain must be provided in order to avoid dazzling effect from the lights.

12.5.6.3 All mandatory radio equipment (except mandatory VHF, see 12.6.1.2) should be located in the radio workstation. 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, must be located outside this workstation.

(IMO Resolutions A.664(16), A.807(19) Annex item 3.2 regarding EGC, and A.610(15), A.806(19) Annex D item 8 regarding MF and MF/HF DSC requirements)

12.5.6.4 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.

12.5.7 COMMUNICATION OFFICE

- 12.5.7.1 The communication office may be located as required by the shipping company, e.g. in connection to the skipper's office. It should be possible to make public calls and perform general radio communications 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.
- 12.5.7.2 All equipment for written correspondence, as well as telephone services for MF/HF and Inmarsat, should be located in the communication office.
- 12.5.7.3 The remote operation panels for the mandatory equipment must 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 must be possible to conduct distress- and safety communications from the navigating position, and the MF/HF DSC controller must be installed in this position.

(IMO Resolutions A.804(19) and A.806(19))

- 12.5.7.4 Watch receivers and NAVTEX/EGC receivers should be located on the navigation bridge.
- 12.5.7.5 VHF transceivers with DSC used for navigational safety should be located in the front of the navigation bridge.

12.5.8 SHIPS WITH INTEGRATED BRIDGE SYSTEM (IBS)

- 12.5.8.1 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.
- 12.5.8.2 Equipment for the transfer of radiotelephone 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.
- 12.5.8.3 It should be possible also to operate printed communications (data communications via radio and/or Inmarsat) from other areas of the ship.

12.5.9 SHIPS WITH INTEGRATED RADIO COMMUNICATION SYSTEMS (IRCS)

- 12.5.9.1 The IRCS is a system in which individual radio communication 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 radio communications. 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.

- 12.5.9.2 The IRCS should comprise at least two GMDSS workstations each connected to each GMDSS radio communication sensor over a network or connection system. At least two printers should be installed. All requirements laid down in SOLAS 1974, as amended, chapter IV, should be fulfilled.

(IMO Resolution A.811(19))

12.6 GMDSS RADIO EQUIPMENT

12.6.1 LOCATION OF VHF TRANSCEIVERS AND VHF DSC CONTROLLERS

12.6.1.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

- 12.6.1.2 VHF with DSC forming part of the mandatory VHF communication equipment for safety of navigation should be located at 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.

- 12.6.1.3 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.

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 A4. The duplicated VHF transceiver can, however, be located in the “navigating position” instead of in the conning position.

(IMO Resolution. A.702(17), Annex, item 2.1.)

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

(IMO Resolution A.746 (18))

12.6.2 CONTINUOUS WATCH ON DSC VHF CHANNEL 70

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

- a separate VHF channel 70 watch receiver. It should not be muted or interrupted when using other radio equipment, or
- 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
- 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 must be installed, which may be without the DSC function.

(IMO Resolutions A 694 (17) and A 803 (19), Com/Circ. 105)

12.6.3 LOCATION OF MF/HF TRANSCEIVERS

- 12.6.3.1 If the equipment is main or duplicated equipment, it must 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.
- 12.6.3.2 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 A4, 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.
- 12.6.3.3 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.
- 12.6.3.4 If MF/HF installation is chosen as duplicated equipment (MF/HF option) on a ship with A3, there is no requirement for an extra DSC watch receiver.
- (COM/Circ. 105/Clarification)*
- 12.6.3.5 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.
- (IMO Resolution A. 813(19))*
- 12.6.3.6 The MF or MF/HF transmitter should be equipped with an instrument or other provisions indicating antenna current or power delivered to the antenna.
- (IMO Resolutions A.804(19) and A.806(19) Annex 6.1)*
- 12.6.3.7 If the transmitter antenna is not permanently connected to the transmitter, it should be automatically connected before the distress alert is transmitted.

12.6.4 WATCH-KEEPING RECEIVERS FOR DSC

12.6.4.1 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 8414.5 kHz, as well as minimum one of the frequencies 4207.5 kHz, 6312 kHz, 12577 kHz and 16804.5 kHz.

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

(IMO Resolution A.804(19), COM/Circ 105)

12.6.4.3 It must 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.

(IMO Resolutions A.803(19), A 804(19 and A.806(19))

12.6.4.4 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 A4 when maintenance method “duplication of equipment” is used.

(IMO Resolution A.702(17), Annex item 2.1)

12.6.5 WATCH-KEEPING ON MF OR MF/HF DSC

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

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

(COM/Circ.105)

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

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

(COM/Circ. 105)

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.

(COM/Circ. 105)

12.6.5.3 Watch-keeping on DSC calling frequencies

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

Note: Ships in sea areas A2 should be able to transmit and receive general radio communications 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 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, Res. A.804(19) and A.806(19), 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 A4 the installed equipment (MF/HF or Inmarsat, depending on installation solution) should also be used for common radio communications. In these sea areas the requirements for “general” or “public correspondence” are normally fulfilled either by using the HF or Inmarsat equipment.

12.6.6 **SATELLITE SHIP EARTH STATION (SES)**

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

12.6.6.2 The terminal and telephone, if any, may be placed in a “radio work station” in connection with the navigation bridge or in a separate communication office.

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

Note: - Attention should be made to IMO Resolution A807(19), Annex 3.2 regarding Inmarsat-C, which has the following text:

“It should be possible to initiate and make distress calls from the position from which the ship is normally navigated and from at least one other position designated for distress alerting”.

12.6.6.4 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.

12.6.6.5 Skippers should be made aware of measures to ensure communications are maintained with Rescue Co-ordination Centres during distress, ref. MGN 304
(COMSAR/Circ. 13)

12.6.7 CONNECTION OF EXTERNAL LOCATED DATA TERMINAL TO MANDATORY INMARSAT C SHIP EARTH STATION IN THE GMDSS

12.6.7.1 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 1974, as amended, should always be fulfilled.

12.6.7.2 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.

12.6.8 NAVTEX AND EGC (ENHANCED GROUP CALL) RECEIVER

12.6.8.1 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 12.9.1. Antenna and antenna cable should also be permanently installed.

12.6.8.2 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.

(IMO Resolution A.701(17))

12.6.9 SATELLITE FLOAT-FREE EPIRB

12.6.9.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); in [MSN 1871 Chapter 7](#); in [MSN 1872 Chapter 7](#); and in [MSN 1873 Chapter 7](#).

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

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

[\(IMO MSC 471\(101\)\)](#) and *IMO Resolutions A.763(18), A.810(19), and A.812(19)*

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 must fulfil the following additional requirements with regards to location/installation:

- The EPIRB must be installed in the vicinity of the navigation bridge, i.e. on the wings of the navigation bridge. On smaller fishing vessels a location on the top of the wheelhouse may be accepted.

(Com/Circ. 105)

or

- 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.

(Com/Circ. 105)

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 must be given to this requirement. Alternatively, two float-free EPIRBs should be installed.

- 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.

[\(IMO MSC 471\(101\)\)](#)/*IMO Resolution A.810(19)*

- 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.
- It should be noted that Inmarsat EPIRBs are currently being phased out and the service for these ceased in December 2006.

12.6.10 RADAR TRANSPONDERS (SART) (SEE ALSO CHAPTER 10 PARAGRAPH 10.15.1.4)

12.6.10.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); and in [MSN 1873 Chapter 7](#).

12.6.10.2 New and existing vessels over 45m [Registered Length](#) require at least two SARTs. New vessels over 24m [Registered Length](#) but under 45m [Registered Length](#) may have one SART.

12.6.10.3 New and existing vessels over 45m [Registered Length](#) require at least two SARTs. New vessels over 24m [Registered Length](#) but under 45m [Registered Length](#) may have one SART.

12.6.10.4 The radar transponders should be placed in brackets on both sides of the vessel and preferably visible from the navigation bridge. It must be easy to bring the transponders to the lifeboats or liferafts. A visible location inside the navigation bridge, close to the outer doors, is recommended. Alternatively, one radar transponder should be placed in each survival craft. Under the requirements of Torremolinos, vessels operating in the Northern regions additionally require each survival craft to be permanently equipped with a SART. Liferafts thus fitted, should be clearly marked accordingly on the valise. 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.

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

12.6.10.6 Locating devices required by Global Maritime Distress Safety System (GMDSS) functional requirement of transmitting and receiving signals for locating by radar operating in the frequency band 9,300-9,500 MHz must be a SART.

12.6.10.7 In consequence a non-directive vessel may have one SART and one AISSART, directive vessels shall have only SART.

12.6.11 HAND HELD (TWO-WAY) GMDSS VHF TRANSCEIVERS

12.6.11.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); and in [MSN 1873 Chapter 7](#).

12.6.11.2 New and existing vessels over 45m [Registered Length](#) require at least three two-way VHF's. New vessels over 24m [Registered Length](#) but less than 45m [Registered Length](#) may carry two.

12.6.11.3 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 must be possible to get easy access to the hand held VHF transceivers without the use of tools.

12.6.11.4 Primary batteries must 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, ref. the IMO requirement for 8 hours operation in emergency situations.

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

(IMO Resolutions A.762(18) and A.809(19))

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

12.6.12 **HAND HELD VHF TRANSCEIVERS AND COMMUNICATIONS FROM THE WINGS OF THE NAVIGATION BRIDGE**

12.6.12.1 In order to fulfil the requirements, mandatory hand held GMDSS VHF can be used. (see section 12.6.1.2). 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 must be controlled by a VHF installed in the front of the navigation bridge.

(COM/Circ 105 Clarification)

12.6.13 **GNSS – GLOBAL NAVIGATIONAL SATELLITE SYSTEM**

12.6.13.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

12.6.13.2 In ships, where GNSS/GNSS should be installed, 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 4 hours whenever the ship is under way.

12.6.13.3 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.

12.6.14 **CONNECTION OF NAVIGATIONAL SENSORS**

12.6.14.1 **GNSS - RECEIVER**

A GNSS receiver must 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.

12.6.14.2 HEADING SENSOR

12.6.14.2.1 If the GMDSS satellite equipment requires automatic antenna adjustment according to ships heading, a heading sensor on the gyro should be connected.

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

12.7 ANTENNA INSTALLATION

12.7.1 GENERAL

12.7.1.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); and in [MGN 330](#).

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

12.7.1.3 A rigging plan of the fitted aerials should be kept available on board every fishing vessel, showing the elevation and plan views of the arrangements, see section 12.3.3.

12.7.1.4 The dangers from exposed aerial lead-ins should be considered see [MGN 330](#).

12.7.2 LOCATION OF VHF ANTENNAE

12.7.2.1 VHF antennae 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.

12.7.2.2 VHF antennae should have a vertical polarisation.

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

12.7.2.4 The location of mandatory VHF antennae 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.

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

12.7.2.6 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.

- 12.7.2.7 Any 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.
- 12.7.2.8 Any 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 m vertical separation. If it is located on the same level as other antennas, the distance apart should be at least 5 metres.

12.7.3 LOCATION AND CHOICE OF MF/HF ANTENNAE

- 12.7.3.1 The mounting arrangement of the antenna or pedestal must be constructed in order to withstand the strain from swaying and vibration. The transmitting whip antenna should be installed as vertical as possible.
- 12.7.3.2 Wire-antennae should be protected against breakage by having a weak link installed.
- 12.7.3.3 Whip antennae should be installed as vertical as possible and located in an elevated position on the ship at least 1 metre away from conductive structures.
- 12.7.3.4 Attention must be paid to self-supportive vertical antennae and their swaying radius.
- 12.7.3.5 The recommended minimum length of the antenna is 8 metres.
- 12.7.3.6 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 45 degrees towards the horizontal plane.
- 12.7.3.7 The transmitting antenna should have an insulation resistance to earth which is recommended to be of more than 50 M Ω in dry weather and of no less than 5M Ω in humid weather (transmitter to be disconnected when measuring).

12.7.4 LOCATION OF ANTENNA TUNER FOR MF/HF TRANSCEIVER

- 12.7.4.1** The antenna tuner should normally be located externally (outdoors) 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.

12.7.5 RECEIVING ANTENNAE

- 12.7.5.1 As a general rule, all receivers including watch-keeping receivers should have their own separate antenna.
- 12.7.5.1 Antennae for watch-keeping receivers should be located as far away as possible from MF/HF transmitting antennae in order to minimise receiver blocking.

12.7.6 SATELLITE COMMUNICATION ANTENNAE

General

12.7.6.1 In general, satellite antennae must be located so that they have a 360-degree free view for the satellite at all times. In practical terms this can be difficult to achieve due to shadow sectors from nearby structures.

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

Satellite communication antenna installation

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

- The antenna should be located at the top of the radar mast; or
- 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 degrees; and
- for omnidirectional antennas; shadows from constructions, especially within a distance of 1 metre, is maximum 2 degrees.
- Antennae must be installed in a readily accessible location;
- They should not be located in an area where they can be damaged by heat and smoke;
- The satellite antenna must not be located on the same plane as the ships radar antenna;
- GNSS antennae should not be located close to or on the same plane as the Inmarsat antenna; and
- Consideration should be given to installing the Inmarsat antenna on a suitable pedestal.

(Ref. IMO Resolutions A.698(17), A-663(16), A 807(19) and Inmarsat Design and Installation Guidelines)

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

Safe antenna distances

12.7.6.4 The following “safe distance” from Inmarsat antennae to other antennae and to the compass are recommended:

- Distance to the HF antenna should be more than 5 metres.
- Distance to VHF antennae should be more than 4 metres.

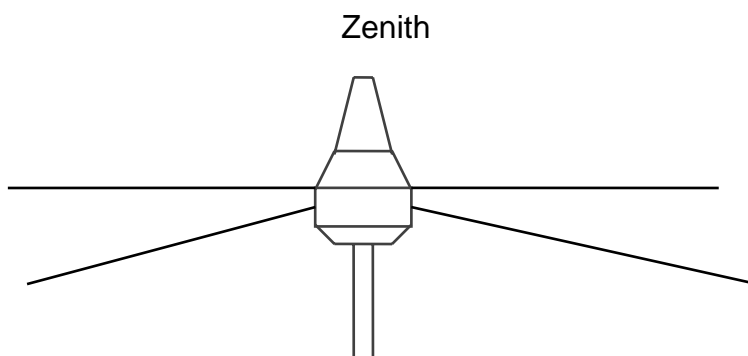
- Distance to the magnetic compass should be more than 3 metres.
(Cf. the installation manual for the equipment and Inmarsat guidelines)

Inmarsat-C antenna

- 12.7.6.5 The antenna should be constructed so as to function up to 15 degrees 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 degrees below the horizon are degrading the performance of the equipment.

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

(IMO Resolutions A663(16) and A.807(19))

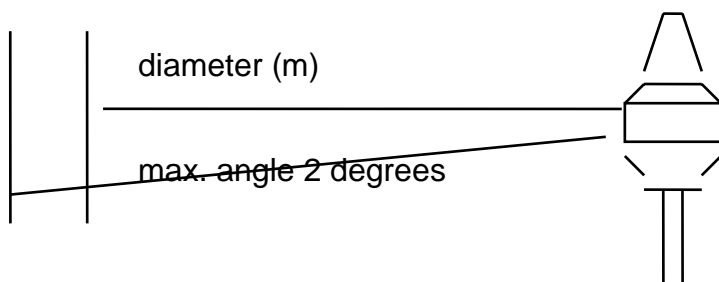


Calculation of distance to obstructions:

- 12.7.6.6 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 degrees 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 meter to eliminate interference.

Antenna cable

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

Antennae for voluntary radio equipment

- 12.7.6.8 Antennae for voluntary radio equipment may be located on deck, provided its use does not interfere with antennae 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.

12.7.7 INSTALLATION OF COAXIAL CABLES

- 12.7.7.1 Coaxial cables should be installed in separate ducting and at least 10 cm away from power supply cables.
- 12.7.7.2 Incorrect installation of cables may change their characteristic impedance resulting in power reflections, which will attenuate the RF signal and reduce the efficiency of the radio equipment.
- 12.7.7.3 In VHF antennae the reflected power should not be greater than 10% of the measured output power.
- 12.7.7.4 The following guidelines should be applied when bending coaxial cables:
- Cables should be crossed at right angles;
 - Where there is one bend in a permanent fixture the bending radius should be 5 times the cables' outside diameter;
 - Where there are several bends, the bending radius should be 10 times the outside diameter of the cable; and
 - When using flexible cable the bending radius should be 20 times the outside diameter of the cable.

12.8 EMC, EARTHING AND SCREENING

12.8.1 ELECTROMAGNETIC COMPATIBILITY (EMC)

General

- 12.8.1.1 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 order to avoid interference, the following rules applies:
- Radio installations must not cause harmful interference to other electronic, electrical or navigational systems on board ships;

- However, these other systems must not cause harmful interference to the radio installation; and
- In order to avoid electromagnetic noise interference, it is essential that manufacturers guidelines relating to EMC, screening and earthing are correctly followed.

(IMO Resolutions A694(17) and A.813(19))

Voluntary radio equipment

12.8.1.2 Additional, voluntarily carried Non-GMDSS radio equipment like e.g.

- Mobile telephone;
- Radio amateur stations; and
- Satellite stations

12.8.1.3 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.

12.8.2 SCREENING OF CABLES

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

- Coaxial down leads must be used for all receiving antennas and the coax screen should be connected to ground on at least one end;
- All cables within a distance of 2 metres from a transmitting antenna must be screened and the screen properly earthed in a metal tube or duct.

12.8.3 EARTHING

12.8.3.1 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:

- Each unit of radio equipment must have a separated earth connection;
- MF/HF antenna tuners must be earthed with either a copper bar or copper band;
- The earthing bar or strap must 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);
- It should be noted that a long earthing strap or bar will act as an antenna and radiate energy;
- Copper bars and straps should be brazed to the steel bulkhead in order to eliminate corrosion and vibration and make a good earth connection; and

- 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 vessels.

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, intercom. and other equipment. The transmitter output power may also be reduced.

12.9 SOURCES OF ENERGY

12.9.1 MAIN SOURCE OF ELECTRICAL POWER

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

12.9.1.2 It is not advisable to provide the main source of electrical power to the GMDSS communications 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.

(IMO Resolution A.702(17) Annex item. 2.3)

12.9.2 EMERGENCY SOURCE OF ELECTRICAL POWER

12.9.2.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); in [MSN 1871](#) Chapter 4; in [MSN 1872](#) Chapter 4; and in [MSN 1873](#) Chapter 4.

12.9.2.2 The emergency supply is usually taken from the emergency generator, but on smaller vessels may be from accumulator batteries.

12.9.2.3 The emergency source must be adequate to operate both the basic and duplicate equipment (if applicable) for 18 hours.

12.9.3 RESERVE SOURCE OF ENERGY

12.9.3.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); in [MSN 1871](#) Chapter 4; in [MSN 1872](#) Chapter 4; and in [MSN 1873](#) Chapter 4.

12.9.3.2 The radio reserve source or sources of energy should meet the requirements set out in IMO Resolutions A.694(17) and A.702(17), as applicable. It usually consists 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 fishing vessels 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.

12.9.3.3 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 communications 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.

12.9.3.4 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.

12.9.3.5 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.

12.9.3.6 The reserve source of energy must be capable of operating the radio installation for at least:

- 1 hour on ships provided with an emergency supply which is adequate to operate the radio communications equipment for a period of 18 hours; or
- 6 hours on ships not provided with an emergency supply as outlined in 12.9.2.

(IMO Resolutions A.694(17), A.702(17) – Annex item 2.3, COMSAR/Circ. 16)

12.9.4 RADIO BATTERY CAPACITY

12.9.4.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); in [MSN 1871 Chapter 4](#); in [MSN 1872 Chapter 4](#); and in [MSN 1873 Chapter 4](#).

12.9.4.2 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.

12.9.4.3 The batteries must have enough capacity to operate all the GMDSS radio equipment for the specific times outlined in 12.9.3.5 above. The total load for the entire radio installation should be calculated prior to the installation of any radio batteries for the reserve supply.

12.9.4.4 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.

- 12.9.4.5 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, VDU's etc.
- 12.9.4.6 If the capacity requirement of radio batteries is to be maintained over their normal life cycle, an extra 40% capacity should be added to the minimum calculated capacity.
- 12.9.4.7 When calculating discharge time, the following guidelines may be of assistance:
- The capacity of a lead acid battery is normally quoted at 20 hours of discharge at an operational temperature of 20^o C;
 - The capacity at 1 hour discharge is approximately 50% of the capacity at 20 hours discharge;
 - The capacity at 6 hours discharge is approximately 80% of the capacity at 20 hours discharge;
 - 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.
- 12.9.4.8 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.

(IMO Resolution A.702(17), COMSAR/Circ. 16)

Note: - When determining the battery capacity, the following must 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.

12.9.5 RADIO BATTERIES

12.9.5.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#).

12.9.5.2 The batteries should be properly marked with type or construction, rated capacity, and installation date. The marking must 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.

12.9.5.3 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.

12.9.5.4 The battery should maintain its rated capacity when inclined at any angle up to 22 ½ degrees in any orientation.

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

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

- capacity and temperature range within which the stated capacity is maintained for the specific operation period i.e. 1 hour or 6 hours;
- charging voltage and current limits in order to keep batteries fully charged while preventing overcharging;
- 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;
- 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 accordance with the battery manufacturer's specifications;
- requirement for ventilation; and
- requirement for maintenance.

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

12.9.5.8 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.

12.9.5.9 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 degrees C. The location should in general satisfy the manufacturers specifications with regards to temperature tolerance and environmental strain in accordance with IEC 60945 or other equivalent standards.

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

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

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

- 12.9.5.13 Electrical installations including battery chargers, located in the battery room should be intrinsically safe.
- 12.9.5.14 Sufficient space between batteries or battery banks should be provided in order to enable inspections and maintenance.
- 12.9.5.15 The cabling from the batteries should be protected against earth- and short-circuits and be appropriately fused and installed according to recognised international standards (IEC 60092-101 and IEC 60533). Battery cables should have sufficient dimensions to prevent voltage reduction at peak current consumption.

(COMSAR/Circ. 16)

12.9.6 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

12.9.6.1 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 Resolution A.694(17), as applicable, and should also comply with the following requirements:

- Comprise an automatic charger; and
- comprise rechargeable accumulator batteries, complying with the guidelines regarding accumulator batteries.
- 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; and
- 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.

(COMSAR/Circ. 16)

Note: - If the UPS does not fulfil the requirements in accordance with 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 utilise 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.

12.9.7 AUTOMATIC BATTERY CHARGERS

12.9.7.1

Automatic chargers for radio batteries should meet the general requirements set out in IMO Resolution A.694(17) and should also comply with the following requirements:

- The charger must be capable of recharging the completely discharged accumulator batteries to the minimum required capacity within 10 hours;
- The charger should be capable of keeping the batteries appropriately charged as prescribed by the manufacturer for permanent charging;
- 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 overcharging 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;
- 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 and indicating failure of the mains supply and / or charger. 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;
- The automatic charger should be operational within five seconds of switching on or after a power supply interruption; and
- The automatic charger should be so designed and constructed that it is protected against damage resulting from disconnection of 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.

(COMSAR/Circ. 16)

Note: - As said in 12.9.1, 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.

12.9.8 PROTECTION OF CIRCUITS FOR ACCUMULATOR BATTERIES

12.9.8.1 Requirements are contained in [MSN1871 Chapter 4](#), [MSN 1872 Chapter 4](#); and in [MSN 1873 Chapter 4](#).

12.9.8.2 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.

12.9.8.3 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.

12.9.8.4 Equivalent solutions may be accepted, e.g. by using double-screened cables in the battery room with explosion-proof fuses. The inner screen must 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.

12.10 CABLING AND WIRING

12.10.1 Requirements are contained in [MSN1871 Chapter 4](#), [MSN 1872 Chapter 4](#); and in [MSN 1873 Chapter 4](#); and in [MGN 628](#) and [MGN 629](#).

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

12.10.3 Cables must 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 = $0,035 \times \text{length (m)} \times \text{total load (A)}$ divided by the cross section in squared mm).

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

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

12.10.1 BATTERY CIRCUITS – FUSES AND BREAKERS

12.10.1.1 Requirements are contained in [MSN1871 Chapter 4](#), [MSN 1872 Chapter 4](#); and in [MSN 1873 Chapter 4](#); and in [MGN 628](#) and [MGN 629](#).

- 12.10.1.2 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.
- 12.10.1.3 A single fault in one of the power units must not affect both the basic and duplicated radio equipment.
- 12.10.1.4 All fuses and breakers must 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”.

12.11 EQUIPMENT FOR NON-DIRECTIVE FISHING VESSELS

12.11.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); in [MSN 1872](#) Chapter 9; and in [MSN 1873](#) Chapter 9.

- 12.11.2 Non-Directive fishing vessels are new vessels 15m Length Overall to 24m Registered Length, and existing vessels of 15m Length Overall to 45m Registered Length.

	<i>Equipment</i>	<i>Sea area</i>			
		<i>A1</i>	<i>A2</i>	<i>A3</i>	<i>A4</i>
1	Hand held VHF radio (a)	1	1	1	1
2	Fixed VHF radio installation (b)	1	1	1	1
3	VHF Channel 70 DSC watch installation (c)	1	1	1	1
4	Float-free satellite EPIRB incl. 121.5 MHz homing device (d)	1	1	1	1
5	MF radio installation (e)		1		
6	INMARSAT – C		or 1	1	
7	MF/HF radio installation (f)		or 1	or 1	1
8	NAVTEX receiver		1	1	1
9	INMARSAT enhanced group calling (EGC) receiver			1	1

Notes:

(a) The equipment must be capable of operating on VHF Channel 16 and one other channel and be of a type specifically designed for operation in survival craft. In particular, the equipment must be rendered fully waterproof either through design or use of suitable covers. A spare, fully charged battery must be available in case of emergency.

- (b) The VHF radio installation must be capable of transmitting and receiving DSC on channel 70, and radiotelephony on channel 6, 13 and 16
- (c) This may be combined with the fixed VHF radio installation
- (d) The satellite EPIRB must be installed in an easily accessible position where it can be manually released and placed in a liferaft.
- (e) The MF radio installation must be capable of transmitting and receiving, for distress and safety purposes, on the frequencies 2187.5 kHz using DSC, which may be separate from or combined with this equipment, must also be provided. If an INMARSAT-C or an MF/HF radio installation is fitted on the fishing vessel, an MF radio installation is not required.
- (f) The MF/HF radio installation must be capable of transmitting and receiving, for distress and safety purposes, on all distress and safety frequencies in the bands between 1,605 kHz and 4000 kHz and between 4000 kHz and 27,500 kHz using DSC, radio telephony and direct-printing telegraphy (telex). A facility to maintain DSC watch on 2,187.5 kHz, 8,414.5 kHz and on at least one of the distress and safety DSC frequencies 4,207.5 kHz, 6,312 kHz, 12,577 kHz or 16,804.5 kHz must also be provided.

12.11.3 The International Maritime Organization (IMO) has recognised Iridium as meeting the necessary technical criteria of a GMDSS Satellite Service. Iridium has a public Service Agreement (PSA) with the International Mobile Satellite Organisation (IMSO) for GMDSS Satellite Services.

12.11.4 Use of Iridium GMDSS Satellite Services needs an appropriate Iridium GMDSS Satellite Services terminal.

12.11.5 The service has been launched but the Maritime Safety Information (MSI) Services may only be relied upon for safety purposes when declared fully operational by the information provider, that is the NAVAREA or METAREA coordinator. This information will be published by IMO in GISIS or in the interim in a circular where the area service will be declared 'operational'.

12.11.6 Where the Iridium MSI service is not fully operational, an Iridium GMDSS terminal is not an equivalent for regulatory compliance to an Inmarsat GMDSS terminal capable of receiving MSI via SafetyNet.

12.12 EQUIPMENT FOR VESSELS OF LESS THAN 15M LENGTH OVERALL

12.12.1 Requirements are contained in the [Radio Regulations 1999 No. 3210](#); and in [MSN 1871](#) Chapters 7 and 9.

12.12.2 Vessels of less than 15m Length Overall must carry either a VHF Fixed radio or a Handheld (Portable) VHF Radio.

Note 2: It should be strongly recommended that radios are DSC.

12.12.3 When operating offshore in Sea Area A1, a VHF radio shall be adequate to contact a coastal radio station in good conditions. For vessels operating in Sea Areas 2 and beyond it is strongly recommended that additional means of communication with greater range such as a Medium Frequency (MF) radio are carried.

12.12.4 Vessels with Liferafts shall carry a Portable VHF Radio. This means that vessels with only a Portable VHF Radio meet the requirements, but a vessel with a liferaft and a Fixed VHF DSC radio must also carry a Portable VHF Radio.

DOCUMENT AMENDMENT HISTORY

Version Number	Status / Change	Date	Author Reviewer	Content Approver	Next Review Date/Expiry Date
02.21	<ul style="list-style-type: none"> • Amendment of Radar transponders section • Amended section numbering 	19/01/21	I Platts/D Fenner	D Fenner	19/01/23
03.21	<ul style="list-style-type: none"> • Update with guidance on Iridium GMDSS on vessels 	02/03/21	D Fenner	G Stone	19/01/23
09.21	<ul style="list-style-type: none"> • Update to reference to MSN1871 Amendment No2 	30/06/21	D Fenner/I Platts	G Stone	06/09/23