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| **Document Title:** PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R M.2135-0 Technical characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz | |
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| **Purpose/Objective:** The purpose of this document is to finalize the revision of Recommendation ITU-R M.2135-0 and advance the document to DR in order to prepare it to be sent to SG5. | |
| **Abstract:** This document will provide the editorial work required to complete this revision of M.2135. Specifically, it will provide the summary of revisions, address one new editor’s note, and add the missing description for one of the fields in the last table in the document. | |

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| PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R M.2135-0 | |
| Technical characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz | |

# 1 Introduction

At the previous meeting of Working Party 5B the meeting considered all input contributions and made progress on a revision to Recommendation ITU-R M.2135. This contribution seeks to finalize the development of this revision.

## 2 Proposal

The United States proposes the following edits to the preliminary draft revision to Recommendation ITU-R M.2135-0 which are contained in Attachment 1. The proposed edits are highlighted in blue.

**Attachment**: 1

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| **Radiocommunication Study Groups** |  |
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| Source: Document 5B/TEMP/258  Subject: Revision of Recommendation [ITU M.2135-0](https://www.itu.int/rec/R-REC-M.2135-0-201910-I) | **Annex 14 to Document 5B/649-E** |
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| PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R M.2135-0 | |
| Technical characteristics of autonomous maritime radio devices operating  in the frequency band 156-162.05 MHz | |

(2019-202X)

Summary of revision

A new annex 2 has be added to describe the technical and operational characteristics of the man overboard (MOB) Class M devices. Additional details have been added to annex 3 for describing the technical and operational characteristics of the AMRD Group B devices utilizing AIS technology. Clarifications have been added to annex 4 for the AMRD Group B devices not utilizing AIS technology. A new annex 5 has been added to detail the messages transmitted by AMRD Group B devices that utilize AIS technology.

Scope

This Recommendation describes autonomous maritime radio devices (AMRD) for use in the maritime environment. The definition and categorization of AMRD are included in Annex 1. digital selective calling ( DSC) Class M – using DSC for alerting and automatic identification system (AIS) technology for tracking. The technical and operational characteristics of AMRD Group B using AIS technology are detailed in Annex 3. The technical and operational characteristics of AMRD Group B using other than AIS technology are detailed in Annex 4. Annex 5 is providing a summary of harmonised messages for AMRD Group B devices using AIS technology.

Keywords

Automatic identification system (AIS), autonomous maritime radio devices (AMRD), digital selective calling (DSC), Maritime

Abbreviations/Glossary

AIS: Automatic identification system

AMRD: Autonomous maritime radio devices

DSC: Digital selective calling

e.i.r.p.: Equivalent isotropically radiated power

GMDSS: Global maritime distress and safety system

IEC: International Electrotechnical Commission

IMO: International Maritime Organization

MOB: Man overboard

RR: Radio regulations

SOLAS: International Convention for the Safety of Life at Sea

VHF: Very high frequency

Related ITU Recommendations and Reports

Recommendations

ITU-R [M.493](https://www.itu.int/rec/R-REC-M.493/en): Digital selective-calling system for use in the maritime mobile service

ITU-R [M.541](https://www.itu.int/rec/R-REC-M.541/en): Operational procedures for the use of digital selective-calling equipment in the maritime mobile service

ITU-R [M.585](http://www.itu.int/rec/R-REC-M.585/en): Assignment and use of identities in the maritime mobile service; or the revised version

ITU-R [M.821](http://www.itu.int/rec/R-REC-M.821/en): Optional expansion of the digital selective-calling system for use in the maritime mobile service

ITU-R [5M.1371](http://www.itu.int/rec/R-REC-M.1371/en): Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band; or the revised version

ITU-R [RA.769](https://www.itu.int/rec/R-REC-RA.769/en): Protection criteria used for radio astronomical measurements

Report

ITU-R [M.2285](https://www.itu.int/pub/R-REP-M.2285): Maritime survivor locating systems and devices (man overboard systems) – An overview of systems and their mode of operation

The ITU Radiocommunication Assembly,

considering

*a)* that the maritime mobile service is a defined service for the operation of specific types of stations, as defined in Radio Regulations (RR) No. **1.28**;

*b)* that the global maritime distress and safety system (GMDSS) is a maritime mobile service application;

*c)* that the automatic identification system (AIS) is a technology for maritime safety related applications, providing identification functions, safety of navigation functions, aids to navigation, locating signals and data communications;

*d)* that autonomous maritime radio devices (AMRD) reflect a new development in the maritime environment;

*e)* that due to the rapid technical progress, more and more AMRD applications in the maritime environment will be operated;

*f)* that, in order to enhance safety of navigation, there is a need to identify and categorize AMRD which operate autonomously in the maritime environment;

*g)* that the operation of AMRD may be for safety-related purposes;

*h)* that relevant characteristics for the operation of AMRD are also contained in the most recent version of Recommendations ITU-R M.493, ITU-R M.585 and ITU-R M.1371;

*i)* that AMRD is categorized into Group A and Group B, which are described in Annex 1;

*j)* that the International Maritime Organization (IMO), International Electrotechnical Commission (IEC) and the International Association of Marine Aids to Navigation and Lighthouse Authorities publish technical documents related to the design and usage of aids to navigation;

*k)* that channel 2006 (160.9 MHz) is designated in Appendix **18** of the RR for AMRD Group B,

recognizing

*a)* that AMRD operate with maritime radio technology such as AIS and digital selective calling (DSC);

*b)* that the use of AMRD should not compromise the integrity of the GMDSS and the operation of AIS;

*c)* that the use of AMRD Group B should not compromise the operation of co-frequency incumbent safety applications, as authorized on a primary basis by certain national administrations;

*d)* that the use of AMRD Group B should not compromise the presentation of AIS information,

recommends

1 that the categorization of AMRD device should be in accordance with Annex 1;

2 That the technical and operational characteristics of Man overboard (MOB) devices should be in accordance with Annex 2;

3 that the technical and operational characteristics of AMRD Group A should be in accordance with the most recent version of Recommendation ITU-R M.1371 or ITU-R M.493;

4 that the technical and operational characteristics of AMRD Group B using AIS technology should be in accordance with Annex 3;

5 that the technical characteristics of AMRD Group B using other than AIS technology should be in accordance with Annex 4.

Annex 1  
  
Categorization of autonomous maritime radio devices

An AMRD is a station in the maritime mobile service which is mobile, operates at sea and transmits independently of a ship station or a coast station, which may also be temporarily moored. They are divided into two groups:

Group A AMRD that enhance the safety of navigation,

Group B AMRD that do not enhance the safety of navigation (AMRD which deliver signals or information which do not concern the navigation of the vessel or do not complement vessel traffic safety in waterways). Group B devices may implement AIS technology or technology other than AIS. Technology other than AIS may be implemented only on an experimental basis.

The term ‘enhance safety of navigation’ is derived from the International Convention for the Safety of Life at Sea (SOLAS), as amended by IMO. Within SOLAS, Chapter V is titled “Safety of navigation” and contains the relevant IMO regulations. Consequently, the criterion for distinguishing AMRD Group A from AMRD Group B is their influence on the safety of navigation. Any signal or information originated by an AMRD that reaches the navigator, can impact the navigation of the vessel. This includes AIS (signals which may be shown on radar and navigational displays) and VHF (channel 70 and working channels). The navigator decides how to act on this information. This information may enhance the safety of navigation. However, signals or information which do not concern the navigation of a vessel can distract or mislead the navigator and degrade the safety of navigation.

AMRD that enhance the safety of navigation should be subject to IMO SOLAS regulations for the presentation of information to the navigators on board vessels.

IMO is the responsible organization for the designation of AMRD Group A. AMRD Group A consists of man overboard-AIS class M and Mobile aids to navigation.

Annex 2  
  
Technical and operational characteristics of selected group A autonomous maritime radio devices

## 1 Man overboard devices using VHF digital selective calling (Class M) and combined with automatic identification system technology

MOB devices should operate in accordance with Recommendations ITU-R M.493 and ITU-R M.1371.

### 1.1 Open and closed loop operation

Man overboard (MOB) devices using VHF DSC should be capable of operating as an open loop/all station device (see 1.7) or as a closed loop/designated station device (see 1.8) only, as described in this Recommendation.

### 1.2 General characteristics

MOB devices should be:

– fitted with an integral electronic position fixing device, a DSC transceiver operating on VHF channel 70 in accordance with Recommendation ITU-R M.493 and combined with an automatic identification system (AIS) transmitter operating in accordance with Recommendation ITU-R M.1371 (for MOB-devices);

– fitted with visual indicators to designate operation of the device and reception of DSC acknowledgment messages; and

– capable of manual and automatic activation and manual deactivation.

### 1.3 Identification number

– The identification number of the MOB devices is in accordance with Recommendation ITU-R M.585 and coded by the manufacturer.

– It should not be possible for the user to change the MOB device’s identification number.

– The MOB device’s identification number should be prominently and permanently marked on the exterior of the device.

### 1.4 Measures to avoid false alerts

Manufacturers should implement measures to avoid false DSC alerts from MOB devices, such as two simple, independent actions needed to start the transmissions:

– where one has to be a manual operation such as an arming function or the protection of a switch by a removable cover;

– and the other which may be an automatic activation such as a water detection system.

Prior to release of the initial transmission a delay for a period not to exceed 30 seconds should be implemented, to allow users to deactivate the MOB device in the case of inadvertent activation. During this period an audible and visual indication has to be provided. These indications are to be activated also at follow up alerts. Equipment designed for intrinsically safe use should provide as a minimum a visual indication.

### 1.5 Distress self-cancel operation

MOB devicesshould be capable of transmitting a distress self-cancel message, as described in Recommendation ITU-R M. 493 and it is only to be used in the following circumstances. The action of switching off a MOB device that has previously sent a distress alert as specified in Recommendation ITU-R M.493 and that has not been acknowledged, should cause the MOB device to transmit the distress self-cancel message.

### 1.6 Action on receipt of acknowledgment messages

If a DSC distress alert acknowledgement message, or a DSC distress alert relay acknowledgment message, in accordance with Recommendation ITU-R M.493 is received by the MOB device, the DSC transmitter should be switched off. The MOB device should indicate reception of the acknowledgment message. However, the AIS function of the MOB device should keep transmitting until switched off.

### 1.7 Open loop operation of man overboard devices

Messages from and to open loop MOB devices using VHF DSC are defined in Recommendation ITU-R M.493. On initial activation, the open loop MOB device should transmit a DSC message formatted as a distress alert.

As soon as the integral electronic position fixing device is able to provide an accurate position and time, the open loop MOB device transmits a further distress alert with the position and time from the position fixing device automatically inserted into the message using the position expansion sequence of Recommendation ITU-R M.821. The AIS transmitter begins transmitting MOB messages at this time. The messages will continue until the MOB device is manually switched off or the battery is exhausted.

After this transmission, the DSC receiver in the open loop MOB device is turned on and monitors the DSC channel for acknowledgment messages for 30 minutes.

If a DSC Distress Alert Acknowledgment message is not received, the open loop MOB device operates with a duty cycle of at least one message every 5 minutes for a period of 30 minutes. The actual transmitter duty cycle is randomly selected duration of between 4.9 and 5.1 minutes.

After 30 minutes have elapsed without an acknowledgment message being received, the open loop MOB device’s duty cycle should then change to 10 minutes. The actual transmitter duty cycle is then a randomly selected duration of between 9.9 and 10.1 minutes. This continues until an acknowledgment message is received, the batteries are exhausted or the MOB device is switched off. After each transmission, the DSC receiver is turned on to monitor the DSC channel for an acknowledgment message for 5 minutes.

### 1.8 Closed loop operation of man overboard devices

Messages from and to closed loop MOB devices using VHF DSC are defined in Recommendation ITU-R M.493.

On initial activation, the closed loop MOB device should transmit a DSC message formatted as a distress alert relay, as specified in Recommendation ITU-R M.493. The destination maritime identity may be either an individual station or a group. The position and time in the initial DSC message should be updated.

As soon as the integral electronic position fixing device is able to provide an accurate position and time, the closed loop MOB device should transmit a further distress alert relay with the position and time from the position fixing device automatically inserted into the message. The position expansion sequence of Recommendation ITU-R M.821 should be used. The AIS transmitter begins transmitting MOB messages at this time. The messages will continue until the MOB device is manually switched off or the battery is exhausted.

After this transmission, the DSC receiver in the closed loop MOB device should turn on and monitor the DSC channel for acknowledgment messages for 30 minutes. If a DSC distress alert relay acknowledgment message is not received, the closed loop MOB device should operate with a duty cycle of at least one message every 5 minutes. The actual transmitter duty cycle should be a randomly selected duration of between 4.9 and 5.1 minutes. If, after a 12 minutes period, a DSC distress alert relay acknowledgment message has not been received, the MOB device should then switch from closed loop to open loop mode by transmitting a DSC message coded as an all ships distress alert as specified in ITU-R M.493 using the internal electronic position fixing device and uses position expansion sequence of Recommendation ITU-R M.821

If a DSC distress alert acknowledgment message is not received, the MOB device should operate with a duty cycle of at least one distress alert every 5 minutes for a period of 30 minutes, i.e. at least one transmission every 5 minutes for a 30 minute period. The actual transmitter duty cycle should be a randomly selected duration of between 4.9 and 5.1 minutes. After each transmission, the DSC receiver should turn on and monitor the DSC channel for acknowledgment messages for 5 minutes.

If after 30 minutes have elapsed without an acknowledgment message being received, the MOB device’s duty cycle should then change to 10 minutes. The actual transmitter duty cycle should be a randomly selected time of between 9.9 and 10.1 minutes. This will continue until an acknowledgment message is received, the batteries are exhausted or the MOB device is switched off. After each transmission, the DSC receiver should turn on and monitor the DSC channel for acknowledgment messages for 5 minutes.

Annex 3  
  
Technical and operational characteristics of group B autonomous maritime radio devices using automatic identification system technology

## 1 Introduction

This Annex specifies general characteristics for AMRD Group B, and how their data should be formatted and transmitted.

An AMRD Group B is a station in the maritime mobile service which is mobile, operates at sea and transmits independently of a ship station or a coast station; which may also be temporarily moored. They are not intended to enhance the safety of navigation or to deliver signals or information which is relevant for the navigator of general shipping. These devices operate on channel 2006 (160.9 MHz); and should not be permitted to use the designated frequencies for DSC and AIS 1 and AIS 2.

Consequently, signals and information originated by AMRD Group B may not always be supported by Radar, electronic chart display and information system. For systems that do, the user should be able to remove such information by a simple operator action.

## 2 Technical characteristics

a) The transmitter e.i.r.p. should be limited to 100 mW.

b) The nine-digit identity of AMRD Group B devices should be in accordance with Recommendation ITU-R M.585.

c) These devices operate on a non-interference basis, i.e. they should not interfere with nor claim protection from other existing services. Interference prevention and mitigation measures should be applied. These include:

* avoiding inland waterways and aggregation of AMRD Group B devices in a local area using geofencing; and
* implementing automated frequency coordination systems, environmental sensing capabilities, and any other interference prevention and mitigation tools, as necessary.

d) These devices operate on channel 2006 (160.9 MHz).

e) These devices should have an integrated antenna. The height of the antenna should not exceed 1 m above the surface of the sea.

f) These devices should have a protected external power switch and transmit indicator.

## 3 General characteristics

AMRD Group B should operate autonomously and determine its own schedule for transmission of messages based on a random selection of transmit slots. The station may transmit messages in either a single transmission or a burst of 4 identical messages no more than once per minute. If so, the increment between transmission slots within a burst should be 75 slots. See Figure 1.

Burst transmission behaviour will increase the probability of reception for units that operate on the surface of the sea transmitting at low power levels.

## 4 Transmitter characteristics

TABLE 1

Parameter settings

| Parameter name | Setting |
| --- | --- |
| Channel (2006) | 160.900 MHz |
| Bit rate | 9 600 bps |
| Training sequence | 24 bits |
| Transmitter settling time (transmit power within 20% of final value. Frequency stable to within ±1 kHz of final value). Tested at manufacturers declared transmit power | ≤ 1.0 ms |
| Ramp down time | ≤ 832 µs |
| Transmission duration | ≤ 26.6 ms |
| Transmitter output power | 100 mW e.i.r.p. |

## 5 Transmitter characteristics

The technical characteristics as specified in Table 2 should apply to the transmitter.

TABLE 2

Minimum transmitter characteristics

| Transmitter parameters | Description |
| --- | --- |
| Carrier power | 100 mW e.i.r.p. (measured over the burst duration) |
| Carrier frequency error | ±500 Hz (normal). ±1 000 Hz (extreme) |
| Transmitter burst duration | < 26.67 ms |
| Slotted modulation mask | ∆*fc* < ±10 kHz: 0 dBc  ±10 kHz < ∆*fc* < ±25 kHz: below the straight line between –20 dBc at ±10 kHz and –36 dBm at ±25 kHz  ±25 kHz < ∆*fc* < ±62.5 kHz: –36 dBm |
| Transmitter test sequence and modulation accuracy | < 3 400 Hz for Bit 0, 1 (normal and extreme)  2 400 Hz ± 480 Hz for Bit 2, 3 (normal and extreme)  2 400 Hz ± 240 Hz for Bit 4 ... 31 (normal, 2 400 ± 480 Hz extreme)  For Bits 32 … 199 1 740 ± 175 Hz (normal, 1 740 ± 350 Hz extreme) for a bit pattern of 0101  2 400 Hz ± 240 Hz (normal, 2 400 ± 480 Hz extreme) for a bit pattern of 00001111 |
| [Transmitter output power versus time | Power within mask shown in Fig. 1 and timings given in Table 3] |
| Transmitter spurious emissions | < −36 dBm 9 kHz to 1 GHz  < −30 dBm 1 GHz to 4 GHz |

TABLE 3

Definitions of timing for Figure 1

| Reference | | Bits | Time (ms) | Definition |
| --- | --- | --- | --- | --- |
| *T*0 | | 0 | 0 | Start of transmission slot. Power should NOT exceed –50 dB of *Pss* before *T*0 |
| *TA* | | 0-6 | 0-0.625 | Power exceeds –50 dB of *Pss* |
| *TB* | *TB1* | 6 | 0.625 | Power should be within +1.5 or –3 dB of *Pss* |
| *TB2* | 8 | 0.833 | Power should be within +1.5 or –1 dB of *Pss (start of training sequence)* |
| *TE* (includes 1 stuffing bit) | | 233 | 24.271 | Power should remain within +1.5 or –1 dB of *Pss* during the period *TB2* to *TE* |
| *TF* (includes 1 stuffing bit) | | 241 | 25.104 | Power should be –50 dB of *Pss* and stay below this |
| *TG* | | 256 | 26.667 | Start of next transmission time period |

Figure 1

Transmitter output envelope versus time

]

## 6 Synchronization accuracy

There is no requirement for UTC synchronization.

## 7 Channel access scheme

[Figure 2

Burst transmissionsA picture containing graphical user interface

Description automatically generated]

## 8 User identification (Unique identifier)

The numbering of AMRD Group B devices should be in accordance with Recommendation ITU-R M.585 in combination with unique identity by transmitting Message 61 with activation, prior shutting down and once per 6 minutes.

## 9 Transmission message behaviour

The messages used by an AMRD Group B device using AIS message structure are described in Annex 5. An AMRD Group B device should transmit at minimum Message 60 Part A, and the identity report Message 61 using the transmission scheme described in section 7. The position report should be transmitted once per minute, and the identity report should be transmitted once per 6 minutes. The other available messages may be transmitted by the AMRD Group B device independent of the transmission schedule described above, with a maximum transmission rate of once per 6 minutes.

Annex 4  
  
Technical characteristics of group B autonomous   
maritime radio devices using other than automatic   
identification system technology

## 1 Introduction

All AMRD Group B should use only channel 2006. Experimental devices that use Channel 2006 (other than as operational Group B AMRD using AIS technology) should observe the characteristics below to ensure compatibility with the Group B AMRD.

## 2 Technical characteristics to ensure compatibility with the autonomous maritime radio devices Group B using automatic identification system technology

a) The transmitter e.i.r.p. should be limited to 100 mW.

b) The transmitting duty cycle should be as low as possible and not to exceed 0.178%.

c) Duration of any single transmission should not exceed 26.7 ms.

d) These devices operate on a non-interference basis, i.e. they should not interfere with nor claim protection from other existing radio communications. Interference prevention and mitigation measures should be applied. These include:

* avoiding inland waterways and aggregation of AMRD Group B devices in a local area using geofencing; and
* implementing automated frequency coordination systems, environmental sensing capabilities, and any other interference prevention and mitigation tools, as necessary.

e) These devices should have an integrated antenna. The height of the antenna should not exceed 1 m above the surface of the sea.

f) These devices should have a protected external power switch and transmit indicator.

g) Where authorized by administrations for experimental use, these devices should operate in accordance with this annex.

TABLE 4

Minimum transmitter characteristics

| Transmitter parameters | Description |
| --- | --- |
| Carrier power | 100 mW e.i.r.p. (measured over the burst duration) |
| Carrier frequency error | ±500 Hz (normal). ±1 000 Hz (extreme) |
| Transmitter burst duration | < 108 ms |
| Slotted modulation mask | ∆*fc* < ±12 kHz: 0 dBc  ±12 kHz < ∆*fc* < ±25 kHz: below the straight line between –20 dBc at ±12 kHz and –36 dBm at ±25 kHz  ±25 kHz < ∆*fc* < ±62.5 kHz: –36 dBm |
| Transmitter spurious emissions | < −36 dBm 9 kHz to 1 GHz  < −30 dBm 1 GHz to 4 GHz |

Annex 5  
  
Messages used for group B autonomous   
maritime radio devices using automatic   
identification system technology

## 1 Introduction

As AMRD are indented to support their user in a specific task, standardised messages, definitive identification and position as well as specific data are relevant for the owner to identify its unit and certain conditions of its operation, the following messages defined in Table 5 have been defined to support these requirements. Message IDs are contained within Recommendation ITU-R M.1371. This recommendation reserves AIS message ID numbers 60 – 63 for the AMRD Group B communications.

### 1.1 Autonomous maritime radio devices message summary

Table 5

Autonomous maritime radio devices message summary

|  |  |  |
| --- | --- | --- |
| Message ID | Name | Description |
| 60 | Position report | This multi-page message provides position, navigation and status information |
| 61 | Identity report | Provides the additional information required to uniquely identify the transmitting device. |
| 62 | Static information report | Provides additional information about the transmitting device |
| 63 | Application specific message | Provides for transmitting binary data |

### 1.2 Autonomous maritime radio devices Group B position report

Message 60, Part A is intended to provide position and identification information necessary for the user and the supervising system to identify and locate the transmitting device. This report may provide additional information about the transmitting device using the extended data pages. This report should be transmitted as specified in Annex 3.

TABLE 6

Position report Part A

| Parameter | Number of bits | Description |
| --- | --- | --- |
| Message ID | 6 | Identifier for Message 60; always 60 |
| Repeat indicator | 2 | The repeat indicator should always be 0 |
| Source ID | 30 | Identifier for the transmitting station per Recommendation ITU-M.585, Autonomous maritime radio devices Group B |
| Part number | 2 | Identifier for the message part number; always 0 for Part A |
| Destination indicator | 1 | 0 = Broadcast (no Destination ID field used)  1 = Addressed (Destination ID uses 30 data bits for Parent MMSI) |
| Destination ID | 0/30 | Identifier for the receiving station per Recommendation ITU-M.585 (if used). This should be the Parent MMSI of the AMRD. |
| Longitude | 28 | Longitude in 1/10 000 min (±180°, East = positive (as per 2’s complement), West = negative (as per 2’s complement);  181° (6791AC0h) = not available = default) |
| Latitude | 27 | Latitude in 1/10 000 min (±90°, North = positive (as per 2’s complement), South = negative (as per 2’s complement);  91 = (3412140h) = not available = default) |
| Time stamp | 6 | UTC second when the report was generated by the EPFS (0-59 or 60) if time stamp is not available, which should also be the default value or 61 if positioning system is in manual input mode or 62 if electronic position fixing system operates in estimated (dead reckoning) mode or 63 if the positioning system is inoperative) |
| Nature of the AMRD Device Code | 7 | Nature of the AMRD Group B Device Code per Table 8. |
| Mobile flag | 1 | 0 = anchored, fixed, or unknown, default  1 = mobile (as defined by Extended Data page XX |
| Position accuracy | 1 | The position accuracy (PA) flag should be determined in accordance with Table 50  1 = high (*≤* 10 m)  0 = low (*>*10 m)  0 = default |
| RAIM-flag | 1 | Receiver autonomous integrity monitoring (RAIM) flag of electronic position fixing device; 0 = RAIM not in use = default; 1 = RAIM in use. See Table 7 |
| Extended Data 1 page ID | 3 | specifies one of the eight Extended Data Pages |
| Extended Data 1 | 10 | Refer to Table 9 – Table 13 |
| Extended Data 2 page ID | 3 | specifies one of the eight Extended Data Pages |
| Extended Data 2 | 10 | Refer to Table 9 – Table 13 |
| Unused bits | 30/0 | These bits are not available for use |
| Number of bits | 168 | Occupies one-time period |

TABLE 7

Determination of position accuracy information

|  |  |  |  |
| --- | --- | --- | --- |
| Accuracy status from RAIM  (for 95% of position fixes)(1) | RAIM flag | Differential correction status(2) | Resulting value of PA flag |
| No RAIM process available | 0 | Uncorrected | 0 = low (>10 m) |
| EXPECTED RAIM error is ≤ 10 m | 1 | 1 = high (≤10 m) |
| EXPECTED RAIM error is > 10 m | 1 | 0 = low (>10 m) |
| No RAIM process available | 0 | Corrected | 1 = high (≤10 m) |
| EXPECTED RAIM error is ≤ 10 m | 1 | 1 = high (≤10 m) |
| EXPECTED RAIM error is > 10 m | 1 | 0 = low (>10 m) |
| (1) The connected GNSS receiver indicates the availability of a RAIM process by a valid sentence of IEC 61162; in this case the RAIM-flag should be set to “1”. The threshold for evaluation of the RAIM information is 10 m. The RAIM expected error is calculated based on “expected error in latitude” and “expected error in longitude” using the following formula:    (2) The quality indicator in the position sentences of IEC 61162 received from the connected GNSS receiver indicates the correction status. | | | |

#### 1.2.1 Type of autonomous maritime radio devices Group B device

This table is used to specify the AMRD Code Name and Code Number according to the type of application the device is used for.

TABLE 8

Type of autonomous maritime radio devices Group B device

| AMRD Code Name | Code Number | Nature Description |
| --- | --- | --- |
| UNKNOWN | 0 | Default, not specified |
| FISHNET | 1 | Fishnet marker |
| STATIC MK | 2 | Static position marker |
| DYNMIC-MK | 3 | Dynamic / mobile position marker |
| DIVER | 4 | Diver tracker |
| RENTAL | 5 | Rental boat tracker |
| AUTONOMY | 6 | Unmanned Autonomous Vehicle |
| HYDRO STA | 7 | Meteorological-hydrological station |
| SURVEYOR | 8 | Survey station |
| REGATTA | 9 | Regatta participant tracker |
| BARGE | 10 | Barge locator |
| FISH POT | 11 | Fish pot marker |
| FISH AREA | 12 | Fish area |
| CABLE END | 13 | Marker of the terminus of a cable or pipe |
|  | 14-127 | Reserved for future use. |

#### 1.2.2 Autonomous maritime radio devices Group B position report extended data pages

The extended data pages are used to provide additional information about the AMRD Group B device. The Message 60 Part A support two simultaneous pages for a single transmission. The device will provide these pages as required, dependent on the application the device is used for. It is possible to provide more than two pages by alternating pages between transmission. The use of these pages will be dependent on the application for which the device has been deployed.

Note that Extended Page IDs 5 – 6 are reserved for future use.

TABLE 9

Extended data, page ID 0 – Speed over ground

| Parameter | Number of bits | Description |
| --- | --- | --- |
| SOG | 10 | Speed over ground in 1/10 knot steps (0-102.2 knots) 1 023 = not available, 1 022 = 102.2 knots or higher |

TABLE 10

Extended data, page ID 1 – Course over ground

| Parameter | Number of bits | Description |
| --- | --- | --- |
| COG | 9 | Course over ground in 1 degree = (0-359). 360 (168h) = not available = default. 361-511 should not be used |
| Reserved | 1 | Reserved for future use |

TABLE 11

Extended data, page ID 2 – dynamic status

| Parameter | Number of bits | Description |
| --- | --- | --- |
| Operational status | 1 | 0 = operating properly, default  1 = operating improperly or erratically |
| Propulsion mode | 3 | 0 = Propelled no further information, default  1 = Propelled autonomously, under 3 kts, on set parameters  2 = Propelled autonomously, under 3 kts, variably  3 = Propelled autonomously, over 3 kts, variably  4 = Propelled autonomously, over 3 kts, on set parameters  5 = Operated remotely, under 3 kts  6 = Operated remotely, over 3 kts  7 = Tethered from a watercraft (e.g., cable, pipe, net) |
| Direction Status | 1 | 0 = Unavailable or unknown, default  1 = Direction provided |
| Direction | 3 | 0 = 000° ± 22.5°  1 = 045° ± 22.5°  2 = 090° ± 22.5°  3 = 135° ± 22.5°  4 = 180° ± 22.5°  5 = 225° ± 22.5°  6 = 270° ± 22.5°  7 = 315° ± 22.5° |
| Reserved | 2 | Reserved for future use |

TABLE 12

Extended data, page ID 3 – health status

| Parameter | Number of bits | Description |
| --- | --- | --- |
| Sensor 1 | 3 | 0 = No information or sensor  1 = Sensor Trending Up  2 = Sensor Trending Down  3 = Sensor no change  4 = TBD  5 = TBD  6 = Sensor Degraded  7 = Sensor Inoperative |
| Sensor 2 | 3 | 0 = No information or sensor  1 = Sensor Trending Up  2 = Sensor Trending Down  3 = Sensor no change  4 = TBD  5 = TBD  6 = Sensor Degraded  7 = Sensor Inoperative |
| Sensor 3 | 3 | 0 = No information or sensor  1 = Sensor Trending Up  2 = Sensor Trending Down  3 = Sensor no change  4 = TBD  5 = TBD  6 = Sensor Degraded  7 = Sensor Inoperative |
| Reserved | 1 | Reserved for future use |

TABLE 13

Extended data, page ID 4 – unit ID

| Parameter | Number of bits | Description |
| --- | --- | --- |
| Unit ID | 6 | Used to identify a specific unit with a range of 1 - 63 |
| Reserved | 4 | Reserved for future use |

### 1.3 Autonomous maritime radio devices Group B proprietary information report

The proprietary information report (Message 60 Part B) should be transmitted as specified in Annex 3.

TABLE 14

Position report Part B

| Parameter | Number of bits | Description |
| --- | --- | --- |
| Message ID | 6 | Identifier for Message 60; always 60 |
| Repeat indicator | 2 | The repeat indicator should always be 0. |
| Source ID | 30 | Identifier for the transmitting station per Recommendation ITU-M.585, Autonomous maritime radio devices Group B |
| Part number | 2 | Identifier for the message part number; always 1 for Part B |
| Destination indicator | 1 | 0 = Broadcast (no Destination ID field used)  1 = Addressed (Destination ID uses 30 data bits for MMSI) |
| Destination ID | 0/30 | Identifier for the receiving station per Recommendation ITU-M.585 (if used).  This should be the Parent MMSI of the AMRD. |
| Proprietary data | 127/97 | For proprietary use |
| Number of bits | 168 | Occupies one-time period |

### 1.4 Autonomous maritime radio devices Group B additional reports

The Message 60, Part C and D are for future use

### 1.5 Autonomous maritime radio devices Group B Identity report

The identity report provides the additional information required to uniquely identify the transmitting device. This report should be transmitted as specified in Annex 3.

TABLE 15

Autonomous maritime radio devices identity report

| Parameter | Number of bits | Description |
| --- | --- | --- |
| Message ID | 6 | Identifier for Message 61; always 61 |
| Repeat indicator | 2 | The repeat indicator should always be 0. |
| User ID | 30 | Identifier for the transmitting station per Recommendation ITU-M.585, Autonomous maritime radio devices Group B |
| Vendor ID | 42 | Unique identification of the Unit by a number as defined by the manufacturer  See Table 4.1A |
| Parent MMSI | 30 | This should specify the Parent MMSI of the AMRD. A value of 999999999 indicates the AMRD is not associated to a vessel.(1) | |
| AMRD Code Name | 54 | Maximum 9 characters 6 bit ASCII, as defined in Table 8 “@@@@@@@@@” = not available = default. | |
| Spare | 4 |  | |
| Number of bits | 168 | Occupies one-time period | |

(1) The Parent MMSI may be used to associate the AMRD device with the vessel that deployed it.

TABLE 16

Vendor identification field

|  |  |  |
| --- | --- | --- |
| Bit | Information | Description |
| (MSB)  41 …...... 24  (18 bits) | Manufacturer’s ID | The Manufacturer’s ID bits indicate the manufacture’s mnemonic code consisting of three 6 bit ASCII characters(1) |
| 23 …...... 20  (4 bits) | Unit Model Code | The Unit Model Code bits indicate the binary coded series number of the model. The first model of the manufacture uses “1” and the number is incremented at the release of a new model. The code reverts to “1” after reaching to “15”. The “0” is not used |
| 19 …...... 0  (LSB)  (20 bits) | Unit Serial Number | The Unit Serial Number bits indicate the manufacture traceable serial number. When the serial number is composed of numeric only, the binary coding should be used. If it includes figure(s), the manufacture can define the coding method. The coding method should be mentioned in the manual |
| (1) NMEA mnemonic manufacturer codes should be used for Message B Manufacturer ID. Manufacturers and or vendors may request this code via NMEA at www.nmea.org. | | |

### 1.6 Autonomous maritime radio devices Group B static information report

TABLE 17

Autonomous maritime radio devices static information report

|  |  |  |
| --- | --- | --- |
| Parameter | Number of bits | Description |
| Message ID | 6 | Identifier for this Message 62; always 62 |
| Repeat indicator | 2 | The repeat indicator should always be 0 |
| User ID | 30 | As defined by Recommendation ITU-R M.585-9, Autonomous maritime radio devices Group B |
| Dimension of area/reference for position | 30 | Dimensions of area in metres and reference point for reported position  (see section 1.7.1)  If used it should indicate the maximum dimensions of the area. As default should A = B = C = D be set to “0”. |
| Battery Status | 2 | 0 = No battery information  1 = Battery Good  2 = Battery Low  3 = Battery Critical |
| Spare | 96 |  |
| Number of bits | 124 | Occupies one-time period |

#### 1.6.1 Reference point for reported position and overall dimensions of area

The dimension of area field is used to specify the area impacted by the AMRD. The A, B, C, and D values are centered around the reference point as depicted in Figure 3. The dimension values are defined as follow:

TABLE 18

Autonomous maritime radio devices Group B binary message

|  |  |
| --- | --- |
| Table 17 | Figure 3 |
| |  |  |  |  | | --- | --- | --- | --- | |  | Number of bits | Bit Fields | Distance (m) | | A | 10 | Bit 30 - 39 | 0 – 1023  1023 =] 1023 m or greater | | B | 10 | Bit 20 – 29 | 0 – 1023  1023 = 1023 m or greater | | C | 10 | Bit 10 – 19 | 0 – 1023  1023 = 1023 m or greater | | D | 10 | Bit 0 - 9 | 0 – 1023  1023 = 1023 m or greater | | Graphical user interface  Description automatically generated |

### 1.7 Autonomous maritime radio devices Group B binary message

TABLE 19

Autonomous maritime radio devices Group B binary message

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Number of bits | Description | | |
| Message ID | 6 | Identifier for Message 63; always 63 | | |
| Repeat indicator | 2 | The repeat indicator should always be 0 | | |
| Source ID | 30 | As defined by Recommendation ITU-R M.585-9, Autonomous maritime radio devices Group B | | |
| Destination indicator | 1 | 0 = Broadcast (no Destination ID field used) 1 = Addressed (Destination ID uses 30 data bits for MMSI) | | |
| Binary data flag | 1 | 0 = unstructured binary data (no Application Identifier bits used) 1 = binary data coded as defined by using the   16-bit Application identifier | | |
| Destination ID | 0/30 | Destination ID (if used) | | If Destination indicator = 0 (Broadcast); no data bits are needed for the Destination ID. If Destination indicator = 1; 30 bits are used for Destination ID and spare bits for byte alignment. |
| Spare | 0/2 | Spare (if Destination ID used) | |
| Binary data | Broadcast Maximum 128 Addressed Maximum 96 | Application identifier  (if used) | 16 bits | Should be as described in § 1.7.1 | |
| Application binary data | Broadcast Maximum 112 bits Addressed Maximum 80 bits | Application specific data | |
| Maximum number of bits | Maximum 168 | Occupies one-time period | | | |

### 1.7.1 Application identifier

Addressed and broadcast binary messages should contain a 16-bit application identifier, structured as follows:

TABLE 20

|  |  |
| --- | --- |
| Bit | Description |
| 15-6 | Designated area code (DAC). This code is based on the maritime identification digits (MID). Exceptions are 0 (test) and 1 (international). Although the length is 10 bits, the DAC codes equal to or above 1 000 are reserved for future use |
| 5-0 | Function identifier. The meaning should be determined by the authority which is responsible for the area given in the designated area code |