



Recommendation ITU-R M.2135-1
(02/2023)

**Technical and operational characteristics
of autonomous maritime radio devices
operating in the frequency band
156-162.05 MHz**

M Series
**Mobile, radiodetermination, amateur
and related satellite services**



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Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R M.2135-1

Technical and operational characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz

(2019-2023)

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. Man overboard (MOB) Class M devices – using digital selective calling (DSC) for alerting and automatic identification system (AIS) technology for tracking is described in Annex 2. 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 provides a summary of harmonised messages for AMRD Group B devices using AIS technology.

Keywords

Aid to Navigation (AtoN), automatic identification system (AIS), autonomous maritime radio devices (AMRD), digital selective calling (DSC), Maritime

Accronyms

AIS	Automatic identification system
AMRD	Autonomous maritime radio devices
AtoN	Aid to Navigation
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
MAtoN	Mobile Aid to Navigation
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

Recommendation ITU-R M.493 – Digital selective-calling system for use in the maritime mobile service

Recommendation ITU-R M.541 – Operational procedures for the use of digital selective-calling equipment in the maritime mobile service

Recommendation ITU-R M.585 – Assignment and use of identities in the maritime mobile service; or the revised version

Recommendation ITU-R RA.769 – Protection criteria used for radio astronomical measurements

Recommendation ITU-R M.1371 – Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band

Report ITU-R 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 aid 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 operations on AIS1 and AIS2 display and the VHF data link;
- 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 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, and operational use of such devices is not addressed in the RR.

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

A2-1 Man overboard devices using VHF digital selective calling (Class M) and combined with automatic identification system technology

Man overboard (MOB) devices should operate in accordance with Recommendations ITU-R M.493, ITU-R M.541 and ITU-R M.1371.

A2-1.1 Open and closed loop operation

MOB devices using VHF DSC should be capable of operating as an open loop/all station device (see § A2-1.7) or as a closed loop/designated station device (see § A2-1.8) only, as described in this Recommendation.

A2-1.2 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 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.

A2-1.3 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.

A2-1.4 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.

A2-1.5 Distress self-cancel operation

MOB devices should 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.

A2-1.6 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.

A2-1.7 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.

A2-1.8 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 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 minutes 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.