



**Technical characteristics and methods of measurement
for equipment for generation, transmission
and reception of Digital Selective Calling (DSC)
in the maritime MF, MF/HF and/or VHF mobile service;
Part 7: Implementation of Bridge Alert Management (BAM)
in DSC radio equipment**

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Foreword

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This European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 7 of a multi-part deliverable. Full details of the entire series can be found in ETSI EN 300 338-1 [i.1].

National transposition dates

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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document specifies the minimum requirements for GMDSS radiocommunication system using Digital Selective Calling (DSC) Class A, with the capability to operate on a SOLAS bridge with the application of SOLAS regulation V/15 [i.4] and thus implementing the BAM concept defined by IMO in MSC.302(87) [8].

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [1] Recommendation ITU-R M.493-15: "Digital selective-calling system for use in the maritime mobile service".
- [2] ETSI EN 300 338-2: "Technical characteristics and methods of measurement for equipment for generation, transmission and reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and/or VHF mobile service; Part 2: Class A DSC".
- [3] IEC 62923-1 (Ed. 1) (2018): "Maritime navigation and radiocommunication equipment and systems - Bridge alert management - Part 1: Operational and performance requirements, methods of testing and required test results".
- [4] IEC 61162-1 (Ed. 5) (2016): "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners".
- [5] IEC 61162-2: "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 2: Single talker and multiple listeners, high-speed transmission".
- [6] IEC 61162-450 (Ed. 2) (2018): "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 450: Multiple talkers and multiple listeners - Ethernet interconnection".
- [7] IEC 62923-2 (Ed. 1) (2018): "Maritime navigation and radiocommunication equipment and systems - Bridge alert management - Part 2: Alert and cluster identifiers and other additional features".
- [8] IMO Resolution MSC.302(87): "Adoption of performance standards for bridge alert management".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI EN 300 338-1: "Technical characteristics and methods of measurement for equipment for generation, transmission and reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and/or VHF mobile service; Part 1: Common requirements".
- [i.2] IEC 62940:2016: "Maritime navigation and radiocommunication equipment and systems - Integrated communication system (ICS) - Operational and performance requirements, methods of testing and required test results".
- [i.3] IEC 61097-3 (Ed. 2) (2017): "Global maritime distress and safety system (GMDSS) - Part 3: Digital selective calling (DSC) equipment - Operational and performance requirements, methods of testing and required results".
- [i.4] SOLAS: "International Convention for the Safety Of Life At Sea", 1974 (as amended).
- [i.5] IMO Resolution A.1021(26) (2009): "Code on alerts and indicators".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 300 338-1 [i.1] and the following apply:

acknowledge: BAM alert acknowledge

audible indication: sound from the EUT that is not associated with raising a BAM alert of priority alarm or warning in the list of active alerts of the EUT

NOTE: BAM alerts of priority caution and emergency alarm do not have a BAM audible signal, nor have states to handle acknowledgement or silencing.

EXAMPLE 1: A sound indicating a change of control position.

EXAMPLE 2: Table 7.1.1 of IMO Resolution A.1021(26):2009, "Code on Alerts and Indicators" [i.5].

BAM alert: announcement of abnormal situations and conditions requiring attention

NOTE: BAM alerts are divided in four priorities: emergency alarms, alarms, warnings and cautions.

distress event: unique distress situation identified by two (VHF) or three (MF/HF) parameters of the distress information; the MMSI of the vessel in distress and the nature of distress and on MF/HF the mode of subsequent communication

DSC acknowledge: DSC procedure acknowledge

DSC alarm: event in DSC equipment as specified in ETSI EN 300 338-2 [2]

DSC distress acknowledgement: distress DSC message of type Alert Acknowledgement

DSC distress alert: distress DSC message of type Alert

DSC distress relay: distress DSC message of type Relay

DSC urgency message: non-distress DSC message of category Urgency

non-distress DSC message: DSC messages or DSC acknowledgements that do not have the format specifier or category of "distress"

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

A	Assembly
BAM	Bridge Alert Management
CAM	Central Alert Management
DSC	Digital Selective Calling
Ed	Edition
EN	European Norm
ETSI	European Telecommunications Standards Institute
EUT	Equipment Under Test
GMDSS	Global Maritime Distress and Safety System
HF	High Frequency
HMI	Human Machine Interface
ICS	Integrated Communication System
ID	Identity
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
IP	Internet Protocol
ITU	International Telecommunications Union
ITU-R	ITU - Radiocommunications sector
MF	Medium Frequency
MMSI	Maritime Mobile Service Identity
MSC	Marine Safety Committee
N	North/Northern latitude
NM	Nautical Mile
OOW	Officer Of the Watch
RX	Receive(d)/Receiving
S	South/Southern latitude
SAR	Search And Rescue
SFI	System Function ID
SNMP	Simple Network Management Protocol
SOLAS	International convention on the Safety Of Life At Sea 1974
TAG	Transport Annotate and Group
TCP	Transmission Control Protocol
TX	Transmit(ted)/Transmitting
UDP	User Datagram Protocol
VHF	Very High Frequency

4 General requirements

4.1 Bridge alert management implementation

4.1.1 Introduction

Compliance with the BAM concept, including the interfaces required for BAM, is a functional and conceptual extension to, not a substitution of, facilities as required in ETSI EN 300 338-2 [2]. Compliance with ETSI EN 300 338-2 [2] is required unless the present document requires otherwise. According to MSC.302(87) [8] and IEC 62923-1 [3], in case of conflict between the alert requirements of ETSI EN 300 338-2 [2] and the present document, the requirements and tests of the present document and of MSC.302(87) [8], IEC 62923-1 [3] and IEC 62923-2 [7] shall take precedence.

According to the BAM concept it is necessary to prioritize BAM alerts and the priorities shall be determined by the DSC equipment. The BAM concept poses requirements on the alert definition concept, alert properties and the Human Machine Interface (HMI). For guidance see IEC 62923-1 [3], Annex E. Further a signalling interface and a protocol are defined for interfacing equipment to a CAM system or to other BAM compliant equipment according to IEC 62923-1 [3], IEC 61162-1 [4] and IEC 62923-2 [7]. The present document adopts the signalling protocol and allows, within limits, for DSC alarms from radio equipment to be part of the BAM concept or otherwise facilitates these.

4.1.2 Requirements

The EUT shall comply with the requirements of ETSI EN 300 338-2 [2], IEC 62923-1 [3] and IEC 62923-2 [7].

Informative guidance on implementing Bridge Alert Management can be found in Annex B to the present document.

4.1.3 Methods of test and required test results

It shall be confirmed that the EUT complies with the tests in ETSI EN 300 338-2 [2], IEC 62923-1 [3] and IEC 62923-2 [7].

4.2 Audible signals for BAM alerts vs audible indications

4.2.1 General

BAM alerts are alerts falling into the concept of Bridge Alert Management (BAM) (see MSC.302(87) [8] and IEC 62923-1 [3]). BAM applies to all alerts presented on, or transferred to, the bridge of a vessel (the concept can also be applied in other areas). The visual and audible announcements of BAM alerts are always handled on the EUT, and, within limitations, additionally on the CAM system. The latter of which is not covered in the present document (see IEC 62923-1 [3] and IEC 62923-2 [7]).

The BAM concept provides, amongst others, requirements for a human machine interface and provides a standardized method to disseminate the information to the CAM system, thus requiring the support of the alert signalling interface and protocol as defined in IEC 61162-1 [4] and IEC 62923-1 [3].

BAM alerts are distinct from matters such as DSC aural alarms. For the purpose of the present document the audible presentation and handling of DSC aural defined in Recommendation ITU-R M.493-15 [1] and ETSI EN 300 338-2 [2] includes:

- audible signals. An audible signal is intended to recognize the existence and priority of a BAM alert and to identify the equipment where an audible BAM alert can be handled. In the present document some audible signals are directly based on DSC aural, see Annex A and Table A.1;
- sound in the time allotted for speech output. Speech output is intended to recognize the specific BAM alert. Some DSC aural are allowed or required for this purpose, see Annex A and Table A.1; and
- audible indications (see also IEC 62923-1 [3]). Most DSC aural are audible indications for the purpose of the present document. The audible indications that occur together with a caution are listed in Annex A and Table A.1.

Audible indications indicating DSC aural alarms or other situations may be applied in the EUT for functionality that does not warrant a BAM alert, for example a tone for pressing the dedicated distress button, or for situations that do not warrant an audible BAM alert, for example when the corresponding BAM alerts raised are only characterized as a caution (thus without audible signal). Situations where ITU has defined sounds that need to be detached from alert management altogether are therefore not defined in the present document.

Audible indications (mandatory or manufacturer specific) may be applied subject to the requirements defined in clause 4.2.2.

4.2.2 Requirements

BAM alerts of priority warning and alarm shall not be accompanied with an audible indication (only the audible presentation defined in IEC 62923-1 [3] is allowed).

All sounds provided by the EUT that are not required by the present document as (part of the) audible presentation of a BAM alert (i.e. an audible signal for a BAM alert and the signal in the time for 'speech output') are audible indications.

When an audible indication is provided, it shall:

- not be possible to be misinterpreted as a BAM alert;
- not be startling;
- be less disturbing than BAM alerts; and
- be either:
 - momentary or temporary without user interaction; or
 - stop after a defined user action on the equipment, which action is not related to alert management (this user action shall not involve the alert acknowledgement or silencing features). See also clause A.1.

4.2.3 Methods of test and required test results

It shall be confirmed by inspection of the EUT that BAM alerts of priority warning and alarm are not accompanied with an audible indication, thus only the audible presentation defined in IEC 62923-1 [3] shall occur.

It shall be confirmed by inspection of the EUT that when an audible indication is provided, e.g. along with a caution raised or detached from alert management, the audible indication:

- cannot be misinterpreted as a BAM alert;
- is not startling;
- is less disturbing than BAM alerts; and
- is either:
 - momentary or temporary without user interaction; or
 - stops after a defined user action on the equipment, which action is not related to alert management (this user action shall not involve the alert acknowledgement or silencing features). See also clause A.1.

4.3 Interfaces

4.3.1 General requirements

Data interfaces for Bridge Alert Management purposes for the connection with a CAM system, and optionally other BAM compliant equipment, shall be provided and shall comply with at least one of the following standards IEC 61162-1 [4], IEC 61162-2 [5] or IEC 61162-450 [6]. The manufacturer shall specify which alternative(s) (defined in IEC 61162-1 [4], IEC 61162-2 [5] and IEC 61162-450 [6]) the physical interface(s) of the EUT supports.

4.3.2 Construction requirements

4.3.2.1 Physical connection

The general required interface may be:

- physically part of the individual equipment/function; and/or

- connected using an internal (optionally proprietary) interface to a system supporting the required interfaces towards the CAM (e.g. when the individual equipment/function is part of an ICS, see IEC 62940 [i.2]).

Any of these configurations shall constitute the EUT and compliance with the BAM standard IEC 62923-1 [3] shall be demonstrated, presented as a whole including the required external interfaces (see clause 4.3.1). The manufacturer shall declare for which configuration(s) the EUT is suitable. The EUT shall be tested for compliance with the requirements of the present document in all supported configurations.

In case equipment is also capable of being operated without a larger system, such as an ICS, the equipment shall also be capable of being configured to comply with the requirements of the present document, including the interfaces, by itself. In that case, the equipment shall be tested for compliance both as stand-alone equipment and as part of the larger system.

4.3.2.2 Ethernet protocols

The IEC 61162-1 [4] sentences sent over the ethernet IEC 61162-450 [6] are using the UDP multicast datagrams. The traffic limitations and requirements shall be kept as specified in IEC 61162-450 [6].

Other protocols/logical connections may exist on the same physical connection (including TCP/IP or SNMP) if the equipment support these layers. Such extra logical connections may include the possibility of secure remote controlling of the equipment.

4.3.3 Required sentences to support on the external interface

The sentences to be used by the EUT over the BAM interface(s) shall be the ones specified in Table 1 and Table 2 below (see also IEC 61162-1 [4] and IEC 62923-1 [3]).

Table 1: IEC 61162-1 [4] sentences transmitted by the DSC equipment for BAM

Mnemonic	Interface	Name	Comment
ALC	CAM	Cyclic alert list	List of current BAM alerts
AGL (note 2)	CAM	Alert group list	Definition of a functional group
ALF	CAM	Alert sentence	Details of a new or current BAM alert
ARC	CAM	Alert command refused	Alert command not accepted
HBT (note 1)	Alert source	Heartbeat	Supports reliable alert related communication
NOTE 1: Required for BAM compliant equipment, if that is able to request responsibility transfer of a BAM alert from an external alert source.			
NOTE 2: Mandatory for functional alert group sources.			

Table 2: IEC 61162-1 [4] sentences received by the DSC equipment for BAM

Mnemonic	Interface	Name	Comment
ACN	CAM	Alert command	Alert command e.g. acknowledge
AGL (note 2)	Functional alert group sources	Alert group list	Definition of a functional group
HBT (note 1)	Alert source with function type R	Heartbeat	Supports reliable alert related communication
NOTE 1: Mandatory for BAM compliant equipment, if that is able to accept a request for responsibility transfer (see IEC 62923-1 [3] clause 6.9.2.2) from external equipment for BAM alerts of the EUT. DSC equipment is such able equipment.			
NOTE 2: Mandatory for equipment that supports displaying functional alert groups.			

Connection failure of, or failure within, any connected equipment, shall not affect the required performance of the DSC equipment.

4.3.4 Methods of test and required test results

It shall be determined by inspection of the manufacturer's documentation if the equipment is capable to operate as stand-alone BAM compliant equipment and/or is capable to act as part of a BAM compliant system (e.g. an ICS).

The following tests should be performed for all configurations of which the equipment is capable:

- stand-alone BAM compliant equipment; and/or
- part of a BAM compliant system (e.g. ICS).

It shall be confirmed by analytical evaluation that at least one interface compliant with at least one of IEC 61162-1 [4], IEC 61162-2 [5] and/or IEC 61162-450 [6] is available.

It shall be confirmed by inspection that the mandatory sentences in Table 1 can be transmitted by the EUT and that the mandatory sentences in Table 2 can be received and processed by the EUT.

It shall be confirmed by inspection that all supported sentences are transmitted or received in compliance with IEC 61162-1 [4] and IEC 62923-1 [3].

It shall be confirmed by analytical evaluation that connection failure of, or failure within, any connected equipment does not affect the required performance of the EUT.

5 Bridge Alert Management

5.1 Classification of BAM alerts

The priority and categorization of BAM alerts are fully defined and explained in MSC.302(87) [8] and IEC 62923-1 [3].

5.2 Mapping DSC alarms to BAM alerts

5.2.1 Requirements for BAM alerts defined in the present document

For BAM alerts defined in the present document the DSC equipment shall use the alert classification in Table 3. The manufacturer shall provide a document listing all available BAM alerts and their classification in the DSC equipment.

The ALF sentence is used to report details of BAM alerts. For easy identification of BAM alerts defined in the present document the ALF sentences shall be filled according to the following bullets:

- fields Alert identifier, priority and category as specified in Table 3;
- field Alert text for the first ALF sentence shall be as specified in clause 6, including Tables 4 to 8 *Alert Title* columns.

EXAMPLE: "DISTRESS:RX".

- field Alert text for second ALF sentence shall be defined by the manufacturer in accordance with the requirements in clause 6, including Tables 4 to 8 *Alert Description text* columns. The manufacturer shall provide a detailed description of the alert description texts provided.

NOTE: The source ID of a BAM alert, for example "VHF", "VHF number 1", "MF", "HF", "MF/HF", etc. is available in IEC 61162-1 [4] or IEC 61162-2 [5] as a combination of talker ID and physical serial interface (i.e. configuration parameter within receiver). For the IEC 61162-450 [6] the source ID is available as combination of talker ID and TAG block parameter source identification (see IEC 62923-1 [3]).