



**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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# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Modal verbs terminology.....	5
1 Scope .....	6
2 References .....	6
2.1 Normative references .....	6
2.2 Informative references.....	6
3 Definition of terms, symbols and abbreviations.....	7
3.1 Terms.....	7
3.2 Symbols.....	8
3.3 Abbreviations .....	8
4 General requirements .....	8
4.1 Bridge alert management implementation.....	8
4.1.1 Introduction.....	8
4.1.2 Requirements .....	9
4.1.3 Methods of test and required test results.....	9
4.2 Audible signals for BAM alerts vs audible indications .....	9
4.2.1 General.....	9
4.2.2 Requirements .....	10
4.2.3 Methods of test and required test results.....	10
4.3 Interfaces .....	10
4.3.1 General requirements.....	10
4.3.2 Construction requirements .....	10
4.3.2.1 Physical connection.....	10
4.3.2.2 Ethernet protocols .....	11
4.3.3 Required sentences to support on the external interface .....	11
4.3.4 Methods of test and required test results.....	12
5 Bridge Alert Management.....	12
5.1 Classification of BAM alerts .....	12
5.2 Mapping DSC alarms to BAM alerts .....	12
5.2.1 Requirements for BAM alerts defined in the present document.....	12
5.2.2 Requirements for manufacturer defined BAM alerts.....	13
5.2.3 Methods of test and required results .....	14
5.3 Unacknowledged BAM warnings .....	15
5.3.1 Requirements .....	15
5.3.2 Methods of test and required results .....	15
6 Detailed requirements for BAM alerts and alert communication.....	15
6.1 Alert communication.....	15
6.1.1 Requirements .....	15
6.1.2 Method of test and required results.....	16
6.2 Handling DSC alerts of types "distress" and "distress relay" in received distress automated procedure and of category "urgency" in received non-distress automated procedure.....	16
6.2.1 Typical alert flow.....	16
6.2.2 Requirements .....	17
6.2.3 Methods of test and required results .....	19
6.2.3.1 Distress and Distress Relay .....	19
6.2.3.2 Urgency.....	20
6.3 Handling DSC alerts in received non-distress automated procedure other than category urgency .....	21
6.3.1 Typical alert flow.....	21
6.3.2 Requirements .....	21
6.3.3 Methods of test and required results .....	22
6.4 Handling other alerts related to DSC communication equipment .....	23
6.4.1 Typical alert flow.....	23

6.4.2	No position data received by DSC equipment .....	25
6.4.2.1	Requirements .....	25
6.4.2.2	Methods of test and required results .....	25
6.4.3	Antenna Tuner Error or other detected antenna failures (optional) .....	26
6.4.3.1	Requirements .....	26
6.4.3.2	Methods of test and required results .....	27
6.4.4	Transmission power error or otherwise inhibited transmission (optional).....	28
6.4.4.1	Requirements .....	28
6.4.4.2	Methods of test and required results .....	28
<b>Annex A (normative): Audible indications and BAM alert audible signals .....</b>		<b>30</b>
A.1	Aural specifications .....	30
<b>Annex B (informative): Guidelines for designing DSC radios to the BAM concept .....</b>		<b>32</b>
B.1	Introduction .....	32
History .....		35

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## Foreword

This final draft European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards EN Approval Procedure.

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].

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
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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].

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## 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.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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

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## 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 alarms 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 alarms, 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 alarms 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 alarms 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]).

**Table 3: Classification of DSC equipment alerts for BAM alert management purposes**

DSC alert source	Cause (note 2)	BAM priority Warning	BAM priority Caution	Category A	Category B	Unique identifier at alert source (note 3)
VHF DSC radio MF/HF DSC radio	Receipt of distress or urgency DSC call for a new (distress) event (note 5).	x			x	3122 (310)
VHF DSC radio MF/HF DSC radio	Receipt of DSC calls other than distress or urgency.		x		x	3123 (311)
VHF DSC radio MF/HF DSC radio	No position data received by equipment.		x		x	3016 (312)
MF/HF DSC radio (note 1)	Antenna Tuner Error or other detected antenna system failure.	x			x	3115 (313)
VHF DSC radio (note 1) MF/HF DSC radio (note 1)	Transmission power error or otherwise inhibited transmission.	x			x	3008 (314)
NOTE 1: Optional (where the facility to detect this alert is available).						
NOTE 2: See clause 6 for further details regarding the alert causes defined in the present document.						
NOTE 3: The alert identifiers in brackets are legacy identifiers as published in IEC 62940 [i.2] and IEC 61097-3 [i.3]. These shall not be used for BAM alerts raised by the EUT, but can occasionally still be encountered in legacy equipment.						
NOTE 4: A simplified description of the alert categories according to IMO Resolution MSC.302(87) [8] is: <ul style="list-style-type: none"> <li>– Category A: Acknowledge possible only at source or when full graphical information is available. Audible announcement only at location at which acknowledge is possible.</li> <li>– Category B: Acknowledge possible both at source and at a CAM system, if fitted. Audible announcement in every location at which acknowledge is possible.</li> </ul>						
NOTE 5: For each new (distress) event a new automated procedure is triggered. See clause 6.1 for 'DSC parallelism'.						

The BAM alerts defined in the present document (see Table 3) shall additionally comply with the requirements of clause 6.

The audible presentation of BAM alerts listed in Table 3 shall comply with the requirements of Annex A, Table A.1.

All DSC alerts/DSC aural alerts not listed in Table 3 are not part of the BAM concept and are for the purpose of the present document (audible) indications (see clause 4.2).

## 5.2.2 Requirements for manufacturer defined BAM alerts

The manufacturer may define BAM alerts in addition to those defined in Table 3. These additional BAM alerts shall not regard DSC alerts/DSC aural alerts. If available, the additional BAM alerts shall also comply with MSC.302(87) [8], IEC 62923-1 [3] and IEC 62923-2 [7] and be assigned a priority and category accordingly. The manufacturer shall provide a list of these BAM alerts in the user manual, including at least their alert title, alert description text, priority, category, alert identifier and alert escalation behaviour.

The alert title and description text of each alert shall be functional for the operator and the description text shall "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) provide guidance for decision making.

BAM alerts that match with those defined in Table A.1 of IEC 62923-2 [7] shall use the corresponding alert identifiers.

For BAM alerts not defined in Table A.1 of IEC 62923-2 [7], the manufacturer shall specify unique alert identifiers. These alert identifiers shall be assigned within the range 10000 - 9999999 (see IEC 62923-2 [7]). The alert identifiers in this free range shall use the same numbering concept for the last digit as described in Annex A.1 of IEC 62923-2 [7] for alert identifiers above 0300.

### 5.2.3 Methods of test and required results

The test procedure shall be as follows:

- Refer to the manufacturer's documentation.
- Confirm by inspection of the manufacturer's documentation that the BAM alerts described in Table 3 have the correct alert identifier, priority and category.
- Cause the BAM alerts in Table 3.
- Confirm by observation of the EUT and of a CAM emulator that the BAM alerts have the same priority, category and alert identifiers as listed in the manufacturer's documentation.
- Confirm by observation of the EUT and of a CAM emulator that the alerts listed in Table 3 have the prescribed alert titles according to clause 6, including Tables 4 to 8.
- Confirm by observation of the EUT and of a CAM emulator that the alert description texts of the alerts listed in Table 3 comply with the requirements listed in clause 6 and Tables 4 to 8 of the present document.
- Confirm by inspection of the user manual that the alert description texts are described in detail.
- Raise a BAM alert in Table 3.
- Confirm by observation that the audible presentation of the BAM alert complies with Annex A, Table A.1.
- Terminate the BAM alert.
- Repeat this test for all BAM alerts defined in Table 3.
- Confirm by analytical evaluation that all DSC alerts/DSC aural alerts that are not listed in Table 3 are (audible) indications and comply with clause 4.2.
- Refer to the user manual for a list of all manufacturer defined BAM alerts, including at least their title, alert description text, priority, category and alert identifier.
- Confirm by analytical evaluation that these manufacturer defined BAM alerts have been assigned a priority and category in accordance with MSC.302(87) [8] and IEC 62923-1 [3].
- Confirm by analytical evaluation that the alert title and description of the manufacturer defined BAM alerts are functional for the operator and that the alert description texts "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) provide guidance for decision making.
- Confirm by observation that the manufacturer defined BAM alerts that match the alerts defined in Table A.1 of IEC 62923-2 [7] have been assigned the corresponding alert identifiers.
- Confirm by observation that the remaining BAM alerts have been assigned alert identifiers in the range of 10000 - 9999999 (see IEC 62923-2 [7]) and that the numbering concept for the last digit as described in Annex A.1 of IEC 62923-2 [7] for BAM alerts with alert identifiers above 0300 has been implemented.
- Refer to the user manual for a list of all manufacturer defined BAM alerts. If applicable select 12 BAM alerts, to represent all combinations of priority and category. If, for BAM alerts, distinct alert sounds have been defined, include the BAM alerts that represent each distinct alert sound. For these alerts:
  - Raise a selected manufacturer defined BAM alert.
  - For all the selected manufacturer defined BAM alerts, confirm by observation that the audible presentation of the BAM alert complies with IEC 62923-1 [3].
  - Terminate the BAM alert.
  - Repeat this test for all selected manufacturer defined BAM alerts.

For further tests on the properties and definition of BAM alerts listed in Table 3 see clause 6 of the present document.

## 5.3 Unacknowledged BAM warnings

### 5.3.1 Requirements

An unacknowledged BAM warning shall be repeated as a BAM warning after a limited time period not exceeding 5 min. Unacknowledged BAM warnings shall not be escalated to BAM alarm priority. See also IEC 62940 [i.2].

### 5.3.2 Methods of test and required results

The test procedure shall be as follows:

- Refer to the manufacturer's documentation, including the user manual.
- Confirm by inspection of the manufacturer's documentation that all BAM alerts of priority warning do not escalate to alarm priority.
- Confirm by inspection of the manufacturer's documentation that all BAM alerts of priority warning escalate to a BAM alert of priority warning after a limited time period not exceeding 5 min.

NOTE: MSC.302(87) [8] clause 7.6 uses the term 'alert escalation' for both increasing the alert priority of a warning to an alarm and for the repetition of a warning as a warning.

- Cause a BAM alert of priority warning.
- Do not acknowledge the BAM alert.
- Confirm by observation that an unacknowledged BAM warning is repeated as a BAM warning after a limited time period not exceeding 5 min.
- Confirm by observation that an unacknowledged BAM warning is not being changed to BAM alarm priority.

## 6 Detailed requirements for BAM alerts and alert communication

### 6.1 Alert communication

#### 6.1.1 Requirements

The ALF sentence is used to report the status of any BAM alert in the EUT. Alert IDs, priorities and categorization for DSC are defined in Table 3. Further requirements are described below.

The source equipment of the BAM alert (DSC) is solely determined by the talker identifier (see IEC 61162-1 [4]) and/or the source identification parameter SFI (see IEC 61162-450 [6]) and a TAG-block according to IEC 62923-1 [3].

Upon detection of an alert condition, the EUT shall raise a BAM alert and assign an alert identifier to that BAM alert (see IEC 62923-2 [7] and Table 3). The alert identifier shall be distinct for each alert of a different kind and priority.

Several identical causes may be active in parallel. To be able to identify and control parallel incidents of a similar kind and priority (the same alert identifier), the equipment shall assign a unique instance number for each similar incident. The automated procedures described in ETSI EN 300 338-2 [2] are mechanisms able to handle DSC parallelism. Each automated procedure shall be assigned a distinct instance number to be used in the ALF/ALC sentences.

The ALF sentence shall be transmitted at least each time an update of the BAM alert occurs (see IEC 62923-1 [3] and IEC 61162-1 [4] for detailed requirements). Such an ALF message may be triggered by, or trigger, a state transition in the automated procedure. The ALF revision counter shall be incremented and the alert description text may be updated (see IEC 62923-1 [3] and IEC 61162-1 [4] for detailed requirements).

NOTE 1: The handling of the BAM alert may have a separate state engine to the DSC automated procedure handling.

NOTE 2: Clauses 6.2 to 6.4 contain various random checks for BAM alert handling, such as acknowledgement, silencing, escalation and responsibility transfer, in accordance with IEC 62923-1 [3], which checks are not duplicated in all these test clauses. Full BAM compliant alert handling is further determined in clause 4.1 of the present document.

## 6.1.2 Method of test and required results

Use a DSC simulator to send to the EUT a number of DSC calls that will initiate multiple similar automated procedures in the DSC un-acknowledged state. A mixture of received calls that cover the call causes in Table 3 shall be selected.

The following tests shall be performed:

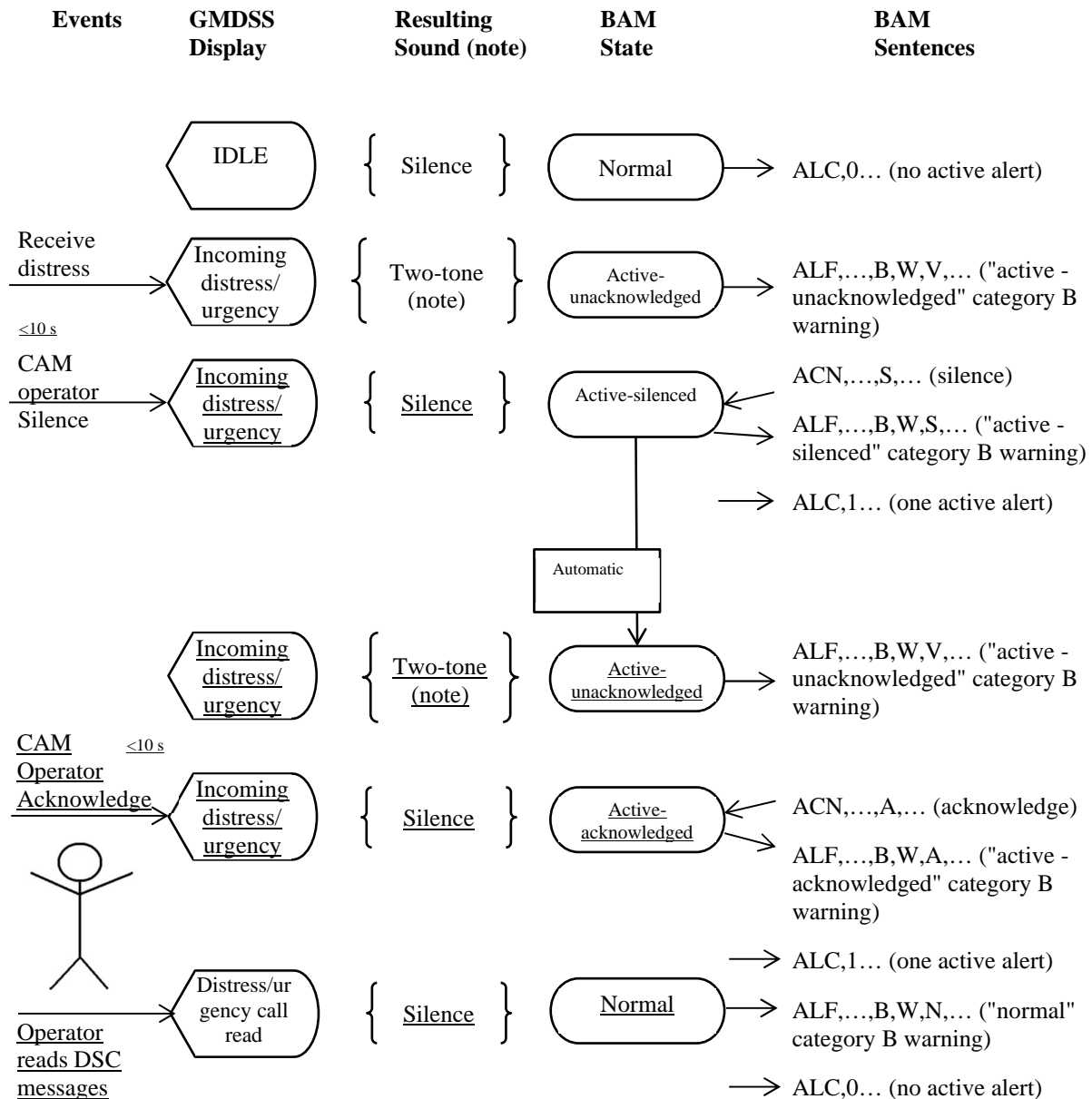
- a) When a DSC alert leads to a BAM alert (warning or caution) as specified in Table 3, it shall be confirmed by observation of a CAM emulator that the appearance of the ALF sentences is according to IEC 62923-1 [3] and IEC 61162-1 [4] and complies with the requirements as defined in clauses 6.2 and 6.3 of the present document.
- b) It shall be confirmed by using a CAM emulator that the call types can be distinguished from each other by alert identifier, and that parallel causes of the same type can be distinguished from each other by instance number. It shall be confirmed by observation that:
  - 1) the category and priority are correctly reflected on the CAM emulator; and
  - 2) the priority is the same as indicated on the EUT.
- c) It shall be confirmed that the talker identifier is according to IEC 61162-1 [4], which is CT for MF/HF equipment and CV for VHF equipment.
- d) Handle some of the received DSC calls in their resultant DSC automated procedures and the corresponding alerts to see they are independently being acknowledged, silenced or otherwise updated, and that events lead to a renewed emission of the ALF sentence according to IEC 62923-1 [3] and IEC 61162-1 [4].

## 6.2 Handling DSC alerts of types "distress" and "distress relay" in received distress automated procedure and of category "urgency" in received non-distress automated procedure

### 6.2.1 Typical alert flow

An example of a typical alert flow is shown in Figure 1 below.





NOTE: See Table A.1.

**Figure 1: Flow diagram describing the relations of display, resulting sound, BAM states and the sentences involved (example with silencing and acknowledgement from CAM and rectification)**

## 6.2.2 Requirements

When a DSC distress alert, DSC distress relay, or a DSC distress acknowledgement is received, for a new distress event, a BAM alert shall be raised according to Table 3 and the requirements below. For such MF and HF calls, a BAM alert shall only be raised when the reported position of the vessel in distress is within 500 NM from the receiving vessel (own ship), or when the distress position is located in the polar areas (exceeding latitudes 70° N or 70° S) as specified in Recommendation ITU-R M.493-15 [1].

NOTE 1: A received DSC distress alert/relay for a new distress event triggers a new automated distress procedure. This includes reception of a DSC distress acknowledgement message when for example the initial DSC distress alert or relay was not received. A received DSC distress message that pertains to an already active automated procedure does not result in a BAM alert.

When a DSC urgency message is received for a new urgency event a BAM alert shall be raised according to Table 3 and the requirements below.

NOTE 2: A received DSC urgency message for a new urgency event triggers a new automated non-distress procedure. A received DSC urgency message that pertains to an active automated procedure (thus an earlier urgency message was received for the same event) does not result in a BAM alert.

The BAM alert is rectified when the operator reads (he accesses the message or presses any button when the message is already on display) the received DSC distress alert/relay or urgency message. When this BAM alert is rectified, this BAM alert shall bypass the state "rectified - unacknowledged". The BAM alert is terminated when the automated procedure is terminated.

The DSC audible alarm can be temporarily silenced over BAM interface.

An example of a possible alert communication flow is shown in Figure 1.

The BAM alert text for these types of DSC messages is given in Table 4.

**Table 4: Alert text in ALF sentence for cause Distress**

#	Alert Title (mandatory)	Alert description text (manufacturer specific)
1	DISTRESS: RX	DSC Information to consider: <ul style="list-style-type: none"> <li>• DSC Un-acknowledged/acknowledged/cancelled</li> <li>• Distress MMSI</li> <li>• Position/time information</li> <li>• Nature of distress</li> <li>• Communication Mode</li> </ul> EXAMPLE 1: Sinking unacknowledged 150 NM 028° true, ch16.
2	DISTRESS: RELAY	DSC Information to consider: <ul style="list-style-type: none"> <li>• DSC Un-acknowledged/acknowledged</li> <li>• Distress MMSI</li> <li>• Position/time information</li> <li>• Nature of distress</li> <li>• Communication Mode</li> <li>• Address</li> </ul> EXAMPLE 2: Sinking unacknowledged 150 NM 028° true, ch16.
3	URGENCY: RX	DSC Information to consider: <ul style="list-style-type: none"> <li>• DSC Un-acknowledged/acknowledged</li> <li>• Address MMSI</li> <li>• Category</li> <li>• Communication Mode</li> <li>• Frequency</li> </ul> EXAMPLE 3: <Category urgency> unacknowledged, 2 182 kHz.
NOTE 1: The sending distress procedure does not lead to any generation of ALF sentences.		
NOTE 2: The content of the alert description text may be updated, at which change the ALF needs to be transmitted (see clause 6.1.1).		

The procedure type handling the distress related causes in Table 3 is always the Receiving Distress automated procedure. The alert title relates to which event caused the procedure:

- 1) Received distress; or
- 2) Received distress relay.

The procedure type handling the urgency related causes in Table 3 is always the Receiving non-distress automated procedure with DSC priority type urgency.

The alert description text shall be functional for the operator, providing "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) guidance for decision making. The operator manual shall show the content of the alert description text.

## 6.2.3 Methods of test and required results

### 6.2.3.1 Distress and Distress Relay

The test procedure shall be as follows.

For this test procedure use a DSC simulator to transmit the necessary DSC alerts to the EUT and connect the EUT to a CAM emulator.

For the reception of MF and HF distress messages:

- Use the DSC simulator in order to transmit to the EUT a DSC distress alert, with a reported distress position more than 500 NM away from the receiving vessel (own ship) and located between the latitudes of 70° N and 70° S.
- Confirm by observation that the EUT does not raise a BAM alert.
- Repeat this for DSC distress relay and for DSC distress acknowledgement using different additional DSC distress events for these DSC messages.
- Terminate all DSC distress automated procedures.

For all types of EUT, use the DSC simulator in order to transmit to the EUT the DSC distress messages described below for distinct distress events (DSC parallelism) that will all initiate distinct DSC received distress automated procedures:

- by VHF, if available in the EUT, otherwise by MF or HF:
  - a DSC distress alert located within 500 NM of the receiving vessel (own ship);
- by MF, if available in the EUT, otherwise by HF, if available in the EUT, otherwise by VHF:
  - a DSC distress relay within 500 NM of the receiving vessel (own ship) and between the latitudes of 70° N and 70° S; and
- by HF, if available in the EUT, otherwise by MF, if available in the EUT, otherwise by VHF:
  - a DSC distress acknowledgement outside 500 NM of the receiving vessel (own ship) but exceeding the latitude of either 70° N or 70° S.

Subsequently:

- Confirm by observation of the EUT and by using a CAM emulator that three BAM alerts are raised and that the mandatory alert titles are according to Table 4.
- Confirm by observation that the alert description texts in the 2<sup>nd</sup> ALF sentences transmitted:
  - are according to the operator manual;
  - take into account Table 4; and
  - are functional, providing "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) guidance for decision making.
- Confirm by inspection of the operator manual that it describes how the alert description text is compiled.
- Use a BAM-compliant equipment emulator to initiate a request for responsibility transfer for one of the "active - unacknowledged" BAM alerts.
- Confirm by observation that responsibility transfer via BAM interface results in the state "active - responsibility" transferred.
- Disconnect the BAM compliant equipment emulator.
- Confirm by observation of the EUT and the CAM emulator that after at maximum 2 min the BAM alert returns to state "active - unacknowledged".

- On the CAM emulator, silence the BAM alerts.
- Confirm by observation of the EUT and the CAM emulator that the BAM alerts are in state "active - silenced" and that the audible signal and speech output ceases.
- Confirm by observation that the BAM alerts automatically return to state "active - unacknowledged" and the audible signal reactivates (for timing see IEC 62923-1 [3]).
- On the CAM emulator, acknowledge two of the three "active - unacknowledged" BAM alerts, excluding the alert caused by receipt of a DSC distress acknowledgement.
- Confirm by observation that these BAM alerts change to state "active - acknowledged".
- For the "active - unacknowledged" alert caused by a DSC distress acknowledgement, access the DSC distress message on the EUT to read it (access the message or press any button when the message is already on display).
- Confirm by observation that the BAM alert is rectified and that the alert bypasses the state "rectified - unacknowledged" and is set to "normal".
- For one of the remaining "active - acknowledged" alerts, access the DSC distress message on the EUT to read it (access the message or press any button when the message is already on display).
- Confirm by observation that the associated BAM alert is rectified and is set to "normal".
- Cause termination of the DSC distress automated procedures pertaining to the remaining alert.
- Confirm by observation that the BAM alert is terminated.

### 6.2.3.2 Urgency

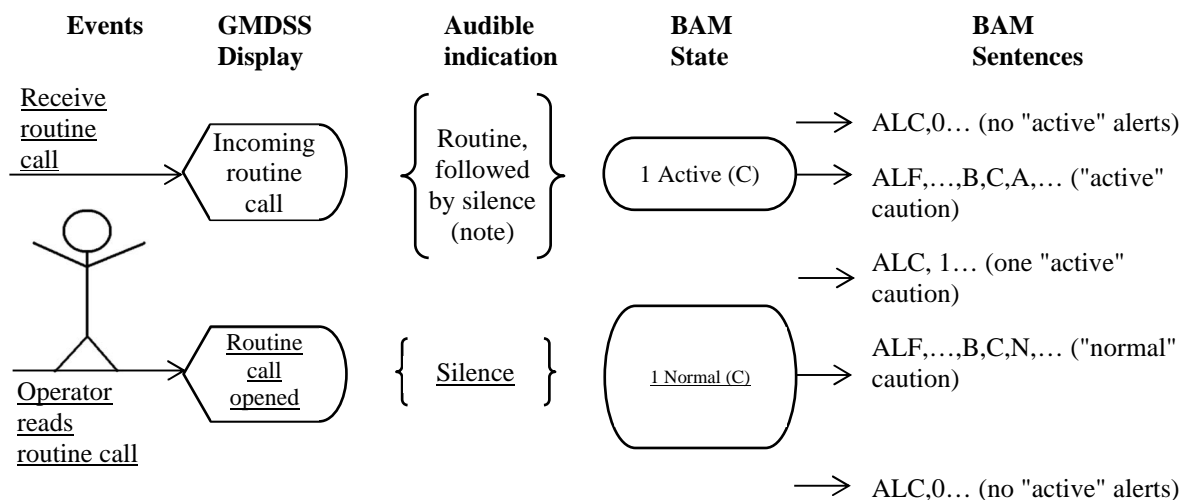
The test procedure shall be as follows:

- Configure a DSC simulator so that the EUT receives two distinct DSC urgency messages that initiate the DSC received non-distress automated procedure for type urgency.
- Confirm by observation of the EUT and by using a CAM emulator that two BAM alerts are raised and that the mandatory alert titles are according to Table 4.
- Confirm by observation that the alert description texts in the 2<sup>nd</sup> ALF sentences transmitted are according to the operator manual, take into account Table 4 and are functional, providing "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) guidance for decision making.
- On the CAM emulator, or if available on the EUT, silence the BAM alerts.
- Confirm by observation of the EUT and the CAM emulator that the BAM alerts are in state "active - silenced" and that the audible signal and speech output ceases.
- Confirm by observation that the BAM alerts automatically return to state "active - unacknowledged" and the audible signal reactivates (for timing see IEC 62923-1 [3]).
- On the EUT, acknowledge one BAM alert pertaining to one DSC urgency message.
- Confirm by observation that the alert changed to state "active - acknowledged".
- Confirm by observation that the yet "active - unacknowledged" BAM alert is rectified when the operator reads the associated DSC urgency message (access the message or press any button when the message is already on display).
- Confirm by observation that the alert bypasses the state "rectified - unacknowledged" and is set to "normal".
- Cause the DSC non-distress automated procedure pertaining to the second ("active - acknowledged") DSC urgency message to be terminated.
- Confirm by observation that the alert is terminated and that the alert is set to "normal".

## 6.3 Handling DSC alerts in received non-distress automated procedure other than category urgency

### 6.3.1 Typical alert flow

An example of a typical alert flow is shown in Figure 2 below.



NOTE: See Table A.1.

**Figure 2: Flow diagram describing the relations of display, audible indication, BAM states and the sentences involved (example with raising and rectification showing all states of cautions)**

### 6.3.2 Requirements

When a non-distress DSC message not being of category urgency is received an alert shall be raised according to Table 3 and the requirements below.

The BAM alert text for this type and category of DSC messages is given in Table 5.

The BAM alert is rectified when the operator reads the non-distress DSC message not being of category urgency (accesses the message or presses any button when the message is already on display) and when the DSC automated procedure is handled or terminated in any way on the EUT.

An example of a possible alert communication flow is shown in Figure 2.

When multiple calls occur that result in the same alert title and alert description text to the operator, only one caution shall be shown for such situation.

**Table 5: Alert text in ALF sentence for received calls other than distress and urgency**

#	Alert Title (mandatory)	Alert description text (manufacturer specific)
1	SAFETY: COM	Information to consider: <ul style="list-style-type: none"> <li>• First telecommand</li> <li>• Second telecommand</li> <li>• MMSI</li> <li>• Communication Mode</li> <li>• Frequency info</li> <li>• Position info</li> </ul> EXAMPLE: Call 219380007 VHF Ch24 at 24 NM 128°.
2	SAFETY: POS	
3	SAFETY: TEST	
4	ROUTINE: COM	
5	ROUTINE: POLL	

The procedure type handling the safety and routine causes in Table 5 is always the Receiving non-distress automated procedure. The alert title relates to which type of call caused the procedure:

- 1) Safety communication.
- 2) Safety position request.
- 3) Safety test request.
- 4) Routine communication.
- 5) Routine poll.

The alert description text shall be functional for the operator, providing "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) guidance for decision making. The operator manual shall explain how the alert description text is compiled.

Any audible indication that coincides with these cautions shall comply with the requirements for audible indications (see clause 4.2.2 and Table A.1).

### 6.3.3 Methods of test and required results

The test procedure shall be as follows:

- Configure a DSC simulator so that the EUT receives safety communication, safety position, safety test, routine communication and routine poll DSC messages that will initiate a number of received non-distress automated procedures (for non-urgency messages).
- When an audible indication is provided along with a caution raised or detached from alert management, confirm by observation that 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.
- Confirm by observation of the EUT and by using a CAM emulator that the mandatory alert titles are used according to Table 5.
- Confirm by observation that the alert description texts in the 2<sup>nd</sup> ALF sentence transmitted:
  - are according to the operator manual;
  - take into account Table 5; and
  - are functional, providing "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) guidance for decision making.
- Confirm by inspection of the operator manual that it describes how the alert description text is compiled.
- For the received non-distress automated procedure, confirm by observation that the BAM alert is set to state "normal" (rectified) when the operator reads the non-distress message not being of type urgency (accesses the message or presses any button when the message is already on display) and when the DSC automated procedure is handled or terminated on the EUT in any way.

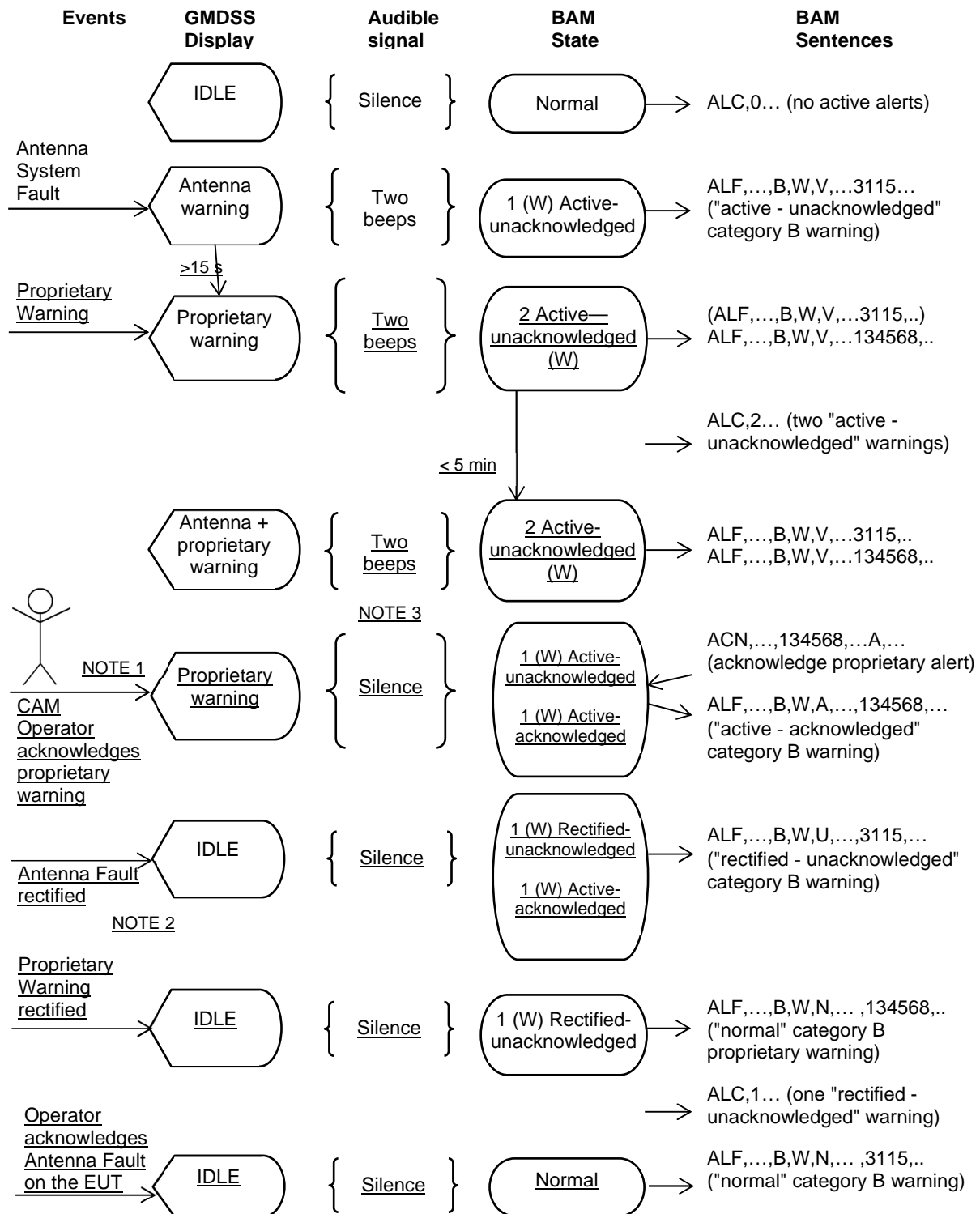
Refer to the manufacturers documentation to find any situation that can lead to the same alert to the operator. If applicable:

- Configure a DSC simulator so that the EUT receives two DSC messages of each kind listed in Table 5 (two safety communications, safety positions, safety tests, routine communications and routine poll DSC calls) that will result in the same information (alert title and alert description text) to the user.
- Confirm by observation that the EUT only presents one BAM alert for each such situation.

## 6.4 Handling other alerts related to DSC communication equipment

### 6.4.1 Typical alert flow

An example of a typical alert flow is shown in Figure 3 below.



**Figure 3: Flow diagram describing the relations of display, audible BAM alerts, BAM states and the sentences involved where multiple simultaneous category B BAM alerts exist, which can be acknowledged from multiple positions**



## 6.4.2 No position data received by DSC equipment

### 6.4.2.1 Requirements

When the EUT is configured for auto position updating and position data has not been received for 10 min or, in the case of turning on the EUT, no position data has been received more than 1 min, a BAM alert shall be raised according to Table 3 and the requirements below.

The BAM alert text for this situation is given in Table 6.

The BAM alert is rectified when the position data reception is re-established.

**Table 6: Alert text in ALF sentence for cause no position data received by equipment**

#	Alert Title (mandatory)	Alert description text (manufacturer specific)
1	SARPOSITION LOST	Information to be considered by the manufacturer, for example: <ul style="list-style-type: none"> <li>• Last valid position</li> <li>• Last valid time of position</li> <li>• Position source for last received position</li> <li>• Manual entry required</li> <li>• Position deleted</li> <li>• Consequence of the situation for the operator</li> <li>• Accuracy of derived information</li> <li>• Operator action required</li> </ul> EXAMPLE: Manual position entry required for SAR.

The alert description text shall be functional for the operator, providing "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) guidance for decision making. The operator manual shall show the content of the alert description text.

Any audible indication provided with these cautions shall comply with the requirements for audible indications (see clause 4.2.2 and Table A.1).

### 6.4.2.2 Methods of test and required results

The test procedure shall be as follows.

The EUT shall be configured for auto position updating. The EUT is initially provided with valid position input. Position input to the EUT shall be stopped.

It shall be confirmed by observation of the EUT and by using a CAM emulator that after 10 min the BAM alert in Table 6 is raised and that the mandatory alert title is according to Table 6.

It shall be confirmed by observation that the alert description text in the 2<sup>nd</sup> ALF sentence transmitted:

- are according to the operator manual;
- take into account Table 6; and
- are functional, providing, "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3), guidance for decision making.

It shall be confirmed by inspection of the operator manual that it describes the content of the alert description text.

When an audible indication is provided along with the caution raised or detached from alert management, it shall be confirmed by observation that 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.

The EUT shall be provided with valid position input. It shall be confirmed by observation that the BAM alert is rectified when the position data input is re-established.

The EUT shall be configured so that it does not to automatically update the position. Then the following test procedure shall be performed:

- Provide the EUT with a valid position input.
- Remove the position input.
- Confirm by observation that the EUT does not provide a BAM alert after 10 min.
- Reconnect the position input.

Then the following test procedure shall be executed:

- Turn off the EUT.
- Do not provide the EUT with a position input.
- Turn on the EUT.
- Confirm by observation that the EUT raises a BAM alert according to Table 6 after 1 min.
- Provide the EUT with valid position input.
- Confirm by observation that the BAM alert is rectified when the position data input is re-established.

### 6.4.3 Antenna Tuner Error or other detected antenna failures (optional)

#### 6.4.3.1 Requirements

If facilities to securely detect genuine errors on antenna tuner or antenna system for MF/HF equipment that may compromise system operability are provided and alerts are raised on negative effects to the system operability, the manufacturer shall provide documentation on how to provoke antenna failure conditions and/or antenna tuner failures for test purposes and the following applies.

When failure conditions that can be detected occur, a BAM alert shall be raised according to Table 3 and the requirements below.

The BAM alert text for this situation is given in Table 7.

This BAM alert is rectified when the antenna/tuner condition is normalized.

An example of a possible alert communication flow is shown in Figure 3.

**Table 7: Alert text in ALF sentence for causes of antenna or antenna tuner failure**

#	Alert Title	Alert description text (manufacturer specific)
1	If the effect can be determined: NO TRANSMISSION NO RECEPTION NO TX/RX If this is not applicable or if the effect cannot be determined: ANTENNA: TUNER	Information to be considered by the manufacturer, for example: <ul style="list-style-type: none"> <li>• Is the equipment able to operate with the current settings?</li> <li>• What is still possible with the equipment</li> <li>• With which settings or limitation can the operator still use the equipment</li> <li>• Antenna tuner equipment</li> <li>• Tuning error</li> </ul> EXAMPLE 1: Use other means for distress.
2	If the effect can be determined: NO TRANSMISSION NO RECEPTION NO TX/RX If this is not applicable or if the effect cannot be determined: ANTENNA: FAILURE	Information to be considered by the manufacturer, for example: <ul style="list-style-type: none"> <li>• Is the equipment able to operate with the current settings?</li> <li>• What is still possible with the equipment</li> <li>• With which settings or limitation can the operator still use the equipment</li> <li>• Antenna power</li> </ul> EXAMPLE 2: Reception range reduced, use alternative.
NOTE 1: The alert title may be adjusted to the situation.		
NOTE 2: To distinct between various alert titles and/or alert description texts, various alert instances can be used.		

The alert description text shall be functional for the operator, providing, "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3), guidance for decision making. The user manual shall show how the alert title is selected and how the alert description text is compiled.

When multiple situations occur that result in the same alert title and alert description text to the operator of the EUT only one alert shall be shown for such situation.

#### 6.4.3.2 Methods of test and required results

The test procedure shall be as follows:

If facilities are provided to securely detect genuine errors on antenna tuner or antenna system for MF/HF equipment that may compromise system operability and alerts are raised on negative effects to the system operability, refer to the manufacturer's documentation on how to provoke antenna failure conditions and/or antenna tuner failure as applicable.

If these facilities are provided:

- Connect the antenna and the antenna tuner according to the manufacturer's installation manual.
- Cause antenna and/or tuner failure according to the procedure in the manufacturer's documentation.
- Confirm by observation of the EUT and by using a CAM emulator that the alert title is according to Table 7.
- Confirm by observation that the alert description texts in the 2<sup>nd</sup> ALF sentence transmitted:
  - are according to the operator manual;
  - take into account Table 7; and
  - are functional, providing, "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3), guidance for decision making.
- Confirm by inspection of the operator manual that it contains information on how the alert title is selected and on how the alert description text is compiled.
- Confirm by observation that the BAM alert can be acknowledged from the CAM emulator and that this results in the acknowledgement of the corresponding BAM alert on the EUT.
- Cause the BAM alert again and confirm by observation that the BAM alert is rectified (transfers to state "rectified - unacknowledged") when the antenna and/or tuner conditions is/are normalized.
- Cause the BAM alert again and confirm by observation that the BAM alert transfers to the state "active - acknowledged" when the BAM alert is acknowledged on the EUT.

- Refer to the manufacturer's documentation. If applicable:
  - Select situations that result in the same alert title and alert descriptive text to the operator of the EUT.
  - Refer to the manufacturer's documentation to provoke antenna failure conditions and/or antenna tuner failure.
  - Cause antenna and/or tuner failure consistent with the selected situations.
  - Confirm by observation that the EUT only presents one BAM alert for each such situation.

## 6.4.4 Transmission power error or otherwise inhibited transmission (optional)

### 6.4.4.1 Requirements

If facilities to securely detect genuine errors on the transmitter that may compromise system operability are provided and alerts are raised on negative effects to the system operability, the manufacturer shall provide documentation on how transmission power condition is set to normal condition and how transmit inhibit or failure can be caused for test purposes and the following applies.

When failure conditions that can be detected occur a BAM alert shall be raised according to Table 3 and the requirements below:

- The BAM alert text for this situation is given in Table 8.
- The BAM alert is rectified when the transmitter condition is normalized.
- An example of a possible alert communication flow is shown in Figure 3.

**Table 8: Alert text in ALF sentence for causes of transmission power inhibit or failure**

#	Alert Title	Alert description text (manufacturer specific)
1	TX POWER:INHIBIT	Information to be considered by the manufacturer, for example: <ul style="list-style-type: none"> <li>• Is the equipment able to operate with the current settings?</li> <li>• What is still possible with the equipment</li> <li>• With which settings or limitation can the operator still use the equipment</li> <li>• Externally inhibited</li> <li>• Transmission blocked</li> </ul> EXAMPLE 1: Switch to ch70. RX works OK.
2	TX POWER:FAIL	Information to be considered by the manufacturer, for example: <ul style="list-style-type: none"> <li>• Is the equipment able to operate with the current settings?</li> <li>• What is still possible with the equipment</li> <li>• With which settings or limitation can the operator still use the equipment</li> <li>• Insufficient power</li> </ul> EXAMPLE 2: Use alternative TX means. RX works OK.

The alert description text shall be functional for the operator, providing "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) guidance for decision making. The operator manual shall explain how the alert description text is compiled.

### 6.4.4.2 Methods of test and required results

The test procedure shall be as follows:

If facilities are provided to detect genuine errors on the transmitter that may compromise system operability and alerts are raised on negative effects to the system operability, refer to the manufacturer's documentation for the means to cause transmission power failures and/or means to inhibit transmission.

If these facilities are provided:

- Setup the EUT in normal operating conditions.
- Cause antenna power failure and/or transmission inhibit according to the procedure in the manufacturers documentation.
- Confirm by observation of the EUT and by using a CAM emulator that the alert title is according to Table 8.
- Confirm by observation that the alert description texts in the 2<sup>nd</sup> ALF sentence transmitted:
  - are according to the manufacturer's manual;
  - take into account Table 8; and
  - are functional, providing "as far as practicable" (see MSC.302(87) [8] clause 8.1 and IEC 62923-1 [3] clause 6.4.3) guidance for decision making.
- Confirm by inspection of the operator manual that it contains explanation on how the alert description text is compiled.
- Confirm by observation that the BAM alert can be acknowledged from the CAM emulator and that this results in the acknowledgement of the corresponding BAM alert on the EUT.
- Cause the BAM alert again and confirm by observation that the BAM alert is rectified (transfers to state "rectified - unacknowledged") when the transmission power and/or inhibit conditions are normalized.
- Cause the BAM alert again and confirm by observation that the BAM alert changes to state "active - acknowledged" when the BAM alert is acknowledged on the EUT.

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# Annex A (normative): Audible indications and BAM alert audible signals

## A.1 Aural specifications

Table A.1 summarizes the specific aural characteristics required by an EUT participating in the BAM concept, in combination with compliance with ETSI EN 300 338-2 [2]. Table A.1 is limited to the situations defined in Table 3, as all other sounds are audible indications (see clause 4.2).

The "Event" in Table A.1 is the reason for the BAM alert detected at EUT. The "BAM audible signal" and "DSC aural" specify the audio characteristic of the aural presentation on the EUT. DSC aurals mentioned are specified in detail in ETSI EN 300 338-2 [2] Table D.2, although possibly limited by the present document. The "resulting sound" described the combined result of the BAM audible signal and DSC aural. The "BAM alert" indicates if according to Table 3 the event shall result in an EUT-alert to the operator and to the CAM, and how. The "increase" specifies whether or not the aural component of the DSC alert shall increase in volume as required by ETSI EN 300 338-2 [2], although not beyond the requirements in the present document. Manual silencing of audible BAM alerts is always an option (always using a CAM-system, optionally also with a manual silence function in the DSC equipment) just like responsibility transfer. Audible indications shall comply with clause 4.2 of the present document; these either terminate automatically or require a user action not related to alert management.

It is assumed in Table A.1, and further in the present document, that any references to received DSC messages refer only to messages implicitly or explicitly addressed to the station.

Due to the categorization of BAM alerts as in Table A.1 the following assumptions are made:

- EUT events triggering BAM alerts of priority warning are the only priority that can be temporary silenced from CAM system; and
- EUT events triggering BAM alerts with priority caution which at the same time emit an audible annunciation (an audible indication) on the EUT shall be self-terminating or shall emit a non-aggressive sound using a repetition interval of at least 15 s until a certain user action that does not relate to alert handling has been performed.

All active audible annunciations shall be temporary silenced if the ACN sentence with alert identifier "0" is received or (optional) a temporary silence command has been initiated on the EUT.

Table A.1: Audible characteristics

Event	BAM alert (see Table 3)	BAM audible signal (note 4)	Sound in the time for speech output (DSC Aural) (note 4)	Audible indication (DSC Aural) (note 3)	Resulting sound at EUT	Increase
Initiating a received distress automated procedure (note 1)	Priority: Warning Category: B	Two short audible signals with the characteristics of the first two DSC 'two-tone alarm' tones and not to be repeated unless escalated according to IEC 62923-1 [3] clause 6.3.7	Two-tone alarm of maximally 5 s (duration is also limited to the time allotted for speech output)	None	DSC two-tone alarm (notes 2 and 4)	Yes
Initiating a received urgency non-distress automated procedure (note 1)	Priority: Warning Category: B	Two short audible signals with the characteristics of the first two DSC 'urgency alarm' tones and not to be repeated unless escalated according to IEC 62923-1 [3] clause 6.3.7	Urgency alert of maximally 5 s (duration is also limited to the time allotted for speech output)	None	DSC Urgency alert (notes 2 and 4)	Yes
Initiating all other priority received non-distress automated procedures (note 1)	Priority: Caution	None	None	DSC routine alert or safety (note 3)	DSC routine alert or safety (note 3)	No
Automatic positioning ceases	Priority: Caution	None	None	DSC position lost (note 3)	DSC position lost (note 3)	No
Antenna Tuner Error or other detected antenna failure	Priority: Warning Category: B	Two short audible signals not to be repeated unless escalated as a warning according to IEC 62923-1 [3] clause 6.3.7 (note 5)	Optional speech output	None	BAM warning (notes 2, 4 and 5)	No
Transmission power error or otherwise inhibited transmission	Priority: Warning Category: B	Two short audible signals not to be repeated unless escalated as a warning according to IEC 62923-1 [3] clause 6.3.7 (note 5)	Optional speech output	None	BAM warning (notes 2, 4 and 5)	No
NOTE 1: Only when the event occurs due to the reception of a DSC message for a new (distress) event.						
NOTE 2: Align sound pattern with BAM Warning, 2 short beeps, silence for next (maximum) 5 min when in state "active - unacknowledged" (see MSC.302(87) [8] clauses 8.3 and 7.6 and IEC 62923-1 [3]).						
NOTE 3: Audible indications are no part of alert management and shall be temporary or momentary without user action, or it stops after a defined user action without using the acknowledgement features. It shall not be possible to confuse an audible indication with a BAM alert (see clause 4.2).						
NOTE 4: These sounds can be mandatorily temporarily interrupted with a temporary silencing command from the CAM or, optionally, on the EUT and these sounds are subject to timing requirements (see IEC 62923-1 [3] and the present table). These sounds shall also be terminated when the BAM alert has been acknowledged, rectified, terminated or responsibility transferred.						
NOTE 5: ETSI EN 300 338-2 [2], Table D.4 allows the manufacturer to define the sound for DSC warning. For these alerts this permission is limited to the requirements of a BAM warning sound "Two short audible signals not to be repeated unless escalated as a warning" (see IEC 62923-1 [3] Table 4).						

For the detailed definition (wording and graphics) on how the audible annunciation of BAM alerts are timed, prioritized and handled, including temporarily silencing, refer to IEC 62923-1 [3], with which the EUT shall comply.

# Annex B (informative): Guidelines for designing DSC radios to the BAM concept

## B.1 Introduction

For the successful integration to the BAM concept a few guidelines on what to consider when adapting to the concept can be made.

The requirements for compliance with the BAM concept are as stated in the present document. Furthermore the BAM concept is to be implemented to comply with consolidated versions of the following standards:

- IEC 61162-1 [4] sentences
- IEC 61162-1 [4] interfaces and/or IEC 61162-2 [5] and/or IEC 61162-450 [6]
- IEC 62923-1 [3] and IEC 62923-2 [7]

For verification of compliance see clause 4.1.2 and clause 4.3.4 of the present document.

Table B.1 lists a few guidelines to consider when interfacing to a CAM and implementing the user interface requirements in the EUT. When conflicts occur, IEC 62923-1 [3], IEC 62923-2 [7] and IEC 61162-1 [4] prevail.

**Table B.1: Guidelines for BAM implementation and CAM interfacing**

Subject	Aspect	Description	Reference
Sentences	ALC	Cyclically transmitted at least each 30 seconds.	IEC 61162-1 [4]
	ALF	It is sent on each change of one of the fields in the sentence, such as: <ul style="list-style-type: none"> <li>• escalation counter increments if BAM warning is escalated into BAM warning;</li> <li>• revision counter is updated each time the sentence is transmitted for the same BAM alert; and</li> <li>• updates of the alert description text (see for example Table 4).</li> </ul> Or on request (using ACN). It is to be assured that the alert identifier and instance number is correct and maintained throughout the specific BAM alert.	IEC 62923-1 [3], IEC 61162-1 [4]  Example Table 4
	ARC	Is transmitted on: <ul style="list-style-type: none"> <li>• all external attempts to acknowledge category A BAM alerts as defined in the EUT; and</li> <li>• request for actions: <ul style="list-style-type: none"> <li>– not required to be implemented and actually not implemented in the product; or</li> <li>– not allowed to be issued by the requestor.</li> </ul> </li> </ul>	IEC 62923-1 [3], IEC 61162-1 [4]
	HBT	When, due to a responsibility transfer request for a BAM alert, the responsibility is currently transferred, the absence of HBT from the responsible sender leads to re-raising the warning to state "active - unacknowledged".	Table 2 note 1 IEC 62923-1 [3], IEC 61162-1 [4]



Subject	Aspect	Description	Reference
<b>BAM alert handling</b>	Escalation	Warnings are not be escalated to alarms. ALF sentences should report escalation of a warning in state "active - unacknowledged" into a renewed warning after a period not exceeding 5 min. This also causes the re-activation of the audible annunciation for the BAM alert at the user interface of the EUT.	Clause 5.3.1 IEC 62940 [i.2] IEC 62923-1 [3]
	Responsibility transfer	Issuing requests for transfer of responsibility is optional. Acceptance of a request for transfer of responsibility is mandatory. The EUT may only deny a request for transfer or responsibility if mandated by IMO and/or an IEC standard applicable to the EUT	Table 1 note 1 Table 2 note 1 clause 6.9 of IEC 62923-1 [3]
	State "rectified - unacknowledged"	This state is mandatory where the present document does not require BAM alerts to be terminated immediately after rectification.	IEC 62923-1 [3] Clause 6 of the present document
<b>Audible annunciation</b>	Warning sound	The sound of the category B BAM alert of priority warning is two short beeps (see IEC 62923-1 [3]). The CAM system will also sound two short beeps (characteristics defined by the CAM system). Category A warnings only sound on the alert source device (EUT). The CAM system (not covered in the present document) will be silent. See note 1.	Annex A IEC 62923-1 [3]  MSC.302(87) [8] Appendix 1
	Caution sound	A caution generated by any bridge mounted equipment will not initiate any sound on the CAM system. It is possible that an audible indication occurs on the alert source equipment, which audible indication is not part of, and distinct from, alert management.	ETSI EN 300 338-2 [2]
	Temporary silencing	Silencing aural annunciation of a BAM warning results in 30 s of silence for that warning, unless a new warning arises.	IEC 62923-1 [3] Annex A
	Temporary silencing of manufacturer defined alarms	The requirements and tests of IEC 62923-1 [3] apply.	IEC 62923-1 [3]
	Sound priority	If multiple "active - unacknowledged" BAM warning alerts are active simultaneously the audible signals of these BAM warning alerts are sounded simultaneously (represented by one) or are spaced in time, all according to IEC 62923-1 [3]. IEC 62923-1 [3] contains provisions that will result in sounding only the most important audible BAM annunciation (i.e. the sound of an alarm when "active - unacknowledged" alarm(s) and warning(s) exist at the same time). The EUT should also use this prioritization of alarms as well as the merging and timing requirements of BAM alerts and audible signals for BAM alert sounds in IEC 62923-1 [3]. BAM does not define the sound priority between individual warnings. For the purpose of the present document, the audible signal of a warning for 'initiating a received distress automated procedure' is to have priority over other warning sounds, if different BAM alerts of priority warning are in state "active - unacknowledged" and need to be represented by one audible announcement.	IEC 62923-1 [3] Figures 3, 4, 5 and 6 of IEC 62923-1 [3]

Subject	Aspect	Description	Reference
	Audible indication sound	<p>On the EUT audible indications are distinct from any audible annunciations of a BAM alert (two/three short beeps).</p> <p>It is to be a non-aggressive sound that indicates a normal use case scenario. The meaning usually is to provide the OOW with information on matters of normal operation.</p> <p>When an audible indication is provided, e.g. along with a caution raised or detached from alert management, confirm by observation that the audible indication:</p> <ul style="list-style-type: none"> <li>• cannot be misinterpreted as a BAM alert;</li> <li>• is not startling;</li> <li>• is less disturbing than BAM alerts; and</li> <li>• is either: <ul style="list-style-type: none"> <li>– momentary or temporary without user interaction; or</li> <li>– stops after a defined user action on the equipment, which action is not related to alert management (this user action does not involve the alert acknowledgement or silencing features). See also clause A.1.</li> </ul> </li> </ul> <p>See note 2.</p>	Clause 4.2
<b>Audible indication</b>	Temporary silencing of audible indications (e.g. when raising a caution)	<p>In case the EUT receives "0" as the alert identifier in the ACN sentence for temporary silence, this addresses all audible BAM alerts.</p> <p>Audible indications however are not part of alert management and the silencing is differently arranged (audible indications do not trigger the CAM silence command). Audible indications are momentary or temporary without user interaction, or stop after a defined user action that is not related to alert management.</p> <p>A CAM is not required to issue a silence command to the DSC equipment when the DSC equipment does not have any audible alerts in state "active - unacknowledged".</p> <p>Nevertheless it is possible to silence audible indications at the same time as audible alerts when a silence command from a CAM (ACN message with "0" as the alert identifier) is received due to some BAM alert in state "active - unacknowledged" (thus audible).</p> <p>If this is done, it is also advised to document in the user manual that it is possible that audible indications are not silenced when a silence command has been given on a connected CAM system, for audible indications are not part of alert management. It is therefore important that an audible indication is not startling, is less disturbing than a BAM audible alert and cannot be mistaken for a BAM audible alert.</p>	IEC 62923-1 [3] Clause 4.2
<p>NOTE 1: Users generally do not easily understand that, and why, category A alerts cannot be acknowledged on the CAM system. It is therefore not recommended to assign category A to alerts not involving graphical information, and not according to the definition in MSC.302(87) [8] Appendix 1.</p> <p>NOTE 2: A CAM system will not replicate an audible indication.</p>			

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## History

<b>Document history</b>			
V1.0.0	July 2021	EN Approval Procedure	AP 20211010: 2021-07-12 to 2021-10-11
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