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**Maritime navigation and radiocommunication equipment and systems –
Automatic identification systems (AIS) – SAR airborne equipment – Operational
and performance requirements, methods of test and required test results**

**Matériels et systèmes de navigation et de radiocommunication maritimes –
Systèmes d'identification automatique (AIS) – Équipement aéroporté SAR –
Exigences d'exploitation et de fonctionnement, méthodes d'essai et résultats
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Exigences d'exploitation et de fonctionnement, méthodes d'essai et résultats
d'essai exigés**

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CONTENTS

FOREWORD.....	7
1 Scope.....	9
2 Normative references	9
3 Terms, definitions, symbols and abbreviated terms.....	9
3.1 Terms and definitions.....	9
3.2 Symbols and abbreviated terms	10
4 General requirements	11
4.1 General.....	11
4.1.1 Overview	11
4.1.2 Capabilities of the AIS	11
4.1.3 Transmitter shutdown procedure.....	11
4.2 Modes of operation	11
5 Performance requirements.....	11
5.1 Composition.....	11
5.2 Time and position	12
5.2.1 Source for UTC.....	12
5.2.2 Source for AIS position reporting	12
5.3 User interface.....	12
5.4 Identification	12
5.5 Information	13
5.5.1 Information provided by the AIS SAR airborne station.....	13
5.5.2 Information reporting intervals.....	13
5.5.3 AIS station reporting capacity.....	14
5.6 Permissible initialization period.....	14
5.7 Technical characteristics.....	14
5.8 Alarms and indications, fall-back arrangements	14
5.8.1 Built-in test equipment.....	14
5.8.2 Alarm messages	14
5.8.3 Status messages	16
6 Technical requirements	18
6.1 General.....	18
6.2 Physical layer	19
6.2.1 General	19
6.2.2 Transmitter parameters.....	19
6.2.3 Receiver parameters	21
6.3 Link layer.....	21
6.3.1 General	21
6.3.2 Link sublayer 1: medium access control (MAC).....	22
6.3.3 Link sublayer 2: data link service (DLS).....	22
6.3.4 Link sublayer 3: link management entity (LME).....	22
6.4 Network layer.....	24
6.4.1 General	25
6.4.2 Setting of operating channels	25
6.5 Transport layer	25
6.6 Presentation interface.....	25
6.6.1 General	25

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6.6.2	Optional automatic input of sensor data	26
6.6.3	High speed input/output ports	27
7	Test conditions	29
7.1	Normal and extreme test conditions	29
7.1.1	Normal test conditions	29
7.1.2	Extreme test conditions	29
7.2	Standard test environment	30
7.3	Additional test arrangements.....	30
7.3.1	Arrangements for test signals applied to the receiver input	30
7.3.2	Encoder for receiver measurements	30
7.3.3	Waiver for receivers.....	30
7.3.4	Impedance.....	30
7.3.5	Artificial antenna (dummy load)	31
7.3.6	Facilities for access	31
7.3.7	Modes of operation of the transmitter.....	31
7.4	Common test conditions for protection from invalid controls	31
7.5	Measurement uncertainties	31
8	Test signals	32
8.1	Standard test signal number 1	32
8.2	Standard test signal number 2 (TDMA)	32
8.3	Standard test signal number 3 (TDMA)	32
8.4	Standard test signal number 4 (PRBS).....	32
8.5	Standard test signal number 5 (PRBS).....	32
9	Power supply, special purpose and safety tests.....	33
10	Environmental tests.....	33
11	Operational tests	33
11.1	Identification and operating modes.....	33
11.1.1	Autonomous mode	34
11.1.2	Polled mode	34
11.1.3	Addressed operation.....	35
11.1.4	Transmission retry	35
11.1.5	Broadcast operation.....	36
11.1.6	Multiple slot messages	37
11.2	Information	37
11.2.1	Information provided by the AIS.....	38
11.3	Initialization period.....	38
11.3.1	Method of measurement	38
11.3.2	Required results	38
11.4	Transceiver protection	38
11.4.1	Method of measurement	38
11.4.2	Required results	38
11.5	Alarms and indicators, fall-back arrangements	38
11.5.1	Monitoring of functions and integrity	38
11.5.2	Monitoring of sensor data	39
12	Physical tests	41
12.1	TDMA transmitter.....	41
12.1.1	Frequency error.....	41
12.1.2	Carrier power.....	42

12.1.3	Slotted transmission spectrum	42
12.1.4	Modulation accuracy	43
12.1.5	Transmitter output power characteristics.....	44
12.2	TDMA receivers	44
12.2.1	Sensitivity.....	44
12.2.2	Error behaviour at high input levels.....	45
12.2.3	Co-channel rejection.....	46
12.2.4	Adjacent channel selectivity.....	46
12.2.5	Spurious response rejection	47
12.2.6	Intermodulation response rejection and blocking.....	49
12.2.7	Blocking or desensitisation	50
12.2.8	Transmit to receive switching time	51
12.2.9	Immunity to out-of-band energy	52
12.3	Conducted spurious emissions.....	52
12.3.1	Spurious emissions from the transmitter	52
12.3.2	Spurious emissions from the receiver	53
13	Specific tests of Link layer	53
13.1	TDMA synchronisation	54
13.1.1	Synchronisation test using UTC	54
13.1.2	Synchronisation test using UTC with repeated messages	54
13.1.3	Synchronisation test without UTC, semaphore.....	55
13.1.4	Synchronisation test without UTC.....	55
13.1.5	Reception of un-synchronised messages	55
13.2	Synchronisation and jitter accuracy.....	55
13.2.1	Definition.....	55
13.2.2	Method of measurement.....	56
13.2.3	Required results	56
13.3	Data encoding (bit stuffing)	56
13.3.1	Method of measurement	56
13.3.2	Required results	56
13.4	Frame check sequence	56
13.4.1	Method of measurement	56
13.4.2	Required results	56
13.5	Slot allocation (channel access protocols).....	56
13.5.1	Network entry	56
13.5.2	Autonomous scheduled transmissions (SOTDMA)	57
13.5.3	Scheduling of other reporting intervals.....	57
13.5.4	Safety related/binary message transmission	58
13.5.5	Transmission of static data with Message 24A (ITDMA).....	58
13.5.6	Transmission of static data with Message 5 (ITDMA).....	59
13.5.7	Assigned operation	59
13.5.8	Group assignment	61
13.5.9	Fixed allocated transmissions (FATDMA).....	64
13.5.10	Randomisation of message transmissions	65
13.6	Message formats	65
13.6.1	Received messages.....	65
13.6.2	Transmitted messages.....	65
14	Specific tests of Network layer.....	66
14.1	Dual channel operation – Alternate transmissions	66

14.1.1	Method of measurement	66
14.1.2	Required results	66
14.2	Regional area designation by serial sentence	66
14.2.1	Method of measurement	66
14.2.2	Required results	66
14.3	Slot reuse	66
14.3.1	Method of measurement	66
14.3.2	Required results	67
15	Specific tests of Transport layer	67
15.1	Behaviour of NavStatus 14 reception	67
15.1.1	Test of AIS SART message	67
15.1.2	Test of MOB-AIS message.....	68
15.1.3	Test of EPIRB-AIS message.....	68
16	Specific presentation interface tests	68
16.1	General.....	68
16.2	Checking manufacturer's documentation	68
16.3	Test of sensor input	69
16.3.1	Test of GNS input	69
16.3.2	Test of RMC input.....	69
16.3.3	Test of DTM input.....	70
16.3.4	Test of GBS input	70
16.3.5	Test of VTG input	71
16.4	Test of high speed output.....	71
16.4.1	Method of measurement	71
16.4.2	Required results	71
16.5	High speed output interface performance	71
16.5.1	Method of measurement	71
16.5.2	Required results	71
16.6	Test of high speed input.....	72
16.6.1	General	72
16.6.2	Test of VSD input sentence	72
16.6.3	Test of SSD input sentence	72
16.6.4	Test of EPV input sentence	73
Annex A (informative)	Block diagram of AIS SAR airborne station.....	74
Bibliography.....		75
Figure 1	– OSI layer model	19
Figure 2	– Power versus time characteristics	20
Figure 3	– Format for repeating four-packet cluster.....	32
Figure 4	– Measurement arrangement for frequency error.....	41
Figure 5	– Measurement arrangement for carrier power	42
Figure 6	– Emission mask for slotted transmission	43
Figure 7	– Measurement arrangement for modulation accuracy	43
Figure 8	– Measurement arrangement	45
Figure 9	– Measurement arrangement with two generators	46
Figure 10	– SINAD or PER/BER measuring equipment	48
Figure 11	– Measurement arrangement for intermodulation.....	50

Figure 12 – Measurement arrangement for blocking or desensitisation 50

Figure 13 – Transmit to receive switching time measurement setup 51

Figure A.1 – Block diagram of AIS SAR airborne station 74

Table 1 – Integrity alarm conditions signalled using ALR sentence formatter 15

Table 2 – Sensor status indications signalled using TXT sentence formatter 16

Table 3 – Position sensor fall-back conditions 17

Table 4 – Use of position accuracy (PA) flag 18

Table 5 – Transmitter parameters 20

Table 6 – Power versus time characteristics 21

Table 7 – Receiver parameters 21

Table 8 – Use of VDL messages 23

Table 9 – Presentation interface access 26

Table 10 – IEC 61162-1 sensor sentences 26

Table 11 – AIS high-speed input data and formats 27

Table 12 – AIS high-speed output data and formats 28

Table 13 – Property identifiers 29

Table 14 – Content of first two packets 33

Table 15 – Fixed PRS data derived from Recommendation ITU-T O.153 33

Table 16 – Peak frequency deviation versus time 44

Table 17 – Frequencies for inter-modulation test 50

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AND SYSTEMS – AUTOMATIC IDENTIFICATION SYSTEMS (AIS) – SAR
AIRBORNE EQUIPMENT – OPERATIONAL AND PERFORMANCE
REQUIREMENTS, METHODS OF TEST AND REQUIRED TEST RESULTS**

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CDV	Report on voting
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MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – AUTOMATIC IDENTIFICATION SYSTEMS (AIS) – SAR AIRBORNE EQUIPMENT – OPERATIONAL AND PERFORMANCE REQUIREMENTS, METHODS OF TEST AND REQUIRED TEST RESULTS

1 Scope

This document specifies the minimum operational and performance requirements, methods of testing and required test results as applicable for automatic identification systems (AIS) VHF data link (VDL) related parts of an AIS SAR airborne station. This document incorporates the applicable technical characteristics of AIS SAR airborne equipment included in Recommendation ITU-R M.1371 and takes into account the ITU Radio Regulations, where applicable.

This document also specifies the minimum requirements for the interfaces to other equipment suitable to be used as means of input and display data.

Attention is drawn on that other requirements specific for airborne equipment can exist and are beyond the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

ITU-R Recommendation M.1371-5:2014, *Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band*

ITU-T Recommendation O.153, *Basic parameters for the measurement of error performance at bit rates below the primary rate*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.2 Symbols and abbreviated terms

For the purpose of this document, the following abbreviated terms apply.

AIS	automatic identification system
AIS-SART	AIS search and rescue transmitter
BITE	built-in test equipment
BT	bandwidth-time
COG	course over ground
CommState	communication state

NOTE 1 Communication state is defined in Recommendation ITU-R M.1371. It is used to organize the slot allocation for SOTDMA or ITDMA.

EPFS	electronic position-fixing systems
EPIRB-AIS	emergency positioning indicating radio beacon AIS
ETA	estimated time of arrival
EUT	equipment under test
FATDMA	fixed access time division multiple access
GMSK	Gaussian minimum shift keying
IMO	International Maritime Organization
ITDMA	incremental time division multiple access
locating device	group of devices including AIS-SART, EPIRB-AIS and MOB-AIS
MAC	medium access control
MMSI	maritime mobile service identity
MOB-AIS	man overboard AIS device
NavStatus	navigational status

NOTE 2 Navigational status is defined in Recommendation ITU-R M.1371. It consists of information that can be input by the ship's crew to indicate whether the ship is underway, moored, etc.

NSS	nominal start slot
NTS	nominal transmission slot
PER	packet error rate
PI	presentation interface
RAIM	receiver autonomous integrity monitoring
RATDMA	random access time division multiple access
RF	radio frequency
SI	selection interval
SOG	speed over ground
SOTDMA	self organizing time division multiple access
UTC	universal time co-ordinated
VDL	VHF data link
VSWR	voltage standing wave ratio
Rx	Receive
Tx	Transmit

4 General requirements

4.1 General

4.1.1 Overview

Requirements contained in Clause 4 are requirements not taken up in other clauses and are verified by observation and inspection of documented evidence.

This document specifies the requirements for the AIS SAR airborne station. The AIS SAR airborne station shall support search and rescue operations involving SAR aircraft.

4.1.2 Capabilities of the AIS

The AIS SAR airborne station shall be capable of providing to ships, and to competent authorities, information from the SAR aircraft, automatically and with the required accuracy and frequency, to facilitate accurate tracking. Transmission of the data shall be with the minimum involvement of personnel.

4.1.3 Transmitter shutdown procedure

An automatic transmitter hardware shutdown procedure and indication shall be provided in case a transmitter continues to transmit for more than 2 s. This shutdown procedure shall be independent of software control.

4.2 Modes of operation

The system shall be capable of operating in a number of modes:

- 1) an "autonomous and continuous" mode for operation in all areas; this mode shall be capable of being switched to from one of the following alternate modes by a competent authority;
- 2) an "assigned" mode for operation in an area subject to a competent authority responsible for traffic monitoring such that the data transmission interval and/or time slots may be set remotely by that authority;
- 3) a "polling" or controlled mode where the data transfer occurs in response to interrogation from a ship or competent authority;
- 4) a "receive only" mode where the station does not transmit.

5 Performance requirements

5.1 Composition

The AIS SAR airborne station shall comprise (see Annex A):

- 1) a communication processor, capable of operating over a range of maritime frequencies, with an appropriate channel selecting and switching method;
- 2) at least one transmitter and two TDMA receiving processes;
- 3) a means of processing data from an electronic position-fixing system which provides a resolution of one ten thousandth of a minute of arc and uses the WGS 84 datum; an interface (see 6.6.2) may be provided to input the position used for navigation;
- 4) a means to automatically input data from other sensors meeting the provisions as specified in 5.5.1 2) may be provided;
- 5) a means of error checking the transmitted and received data (see Clause 6); and
- 6) built-in test equipment (BITE) as specified in 5.8.1.

The AIS SAR airborne station shall be capable of:

- 7) providing information automatically and continuously to other AIS stations, without involvement of personnel;
- 8) receiving and processing information from other AIS stations;
- 9) responding to high priority and safety related calls with a minimum of delay;
- 10) providing positional and manoeuvring information at a data rate adequate to facilitate accurate tracking by a competent authority and other AIS stations (see 5.5.2).

5.2 Time and position

5.2.1 Source for UTC

The AIS shall be provided with an internal GNSS receiver as primary UTC source which is required for synchronisation purposes and for position, COG and SOG.

NOTE UTC includes a provision for leap seconds.

The internal GNSS receiver shall meet appropriate requirements for position accuracy, COG/SOG, acquisition, re-acquisition, receiver sensitivity, RF dynamic range, interference susceptibility, position update, failure warnings, status indications and integrity flag.

If an external source of UTC is provided, it shall fulfil the requirement for synchronization timing.

If date and time is not available and Message 4 or 11 is being received, the unit shall use date and time from that message, and the seconds shall be omitted.

5.2.2 Source for AIS position reporting

The source for position reporting may vary depending on the conditions specified in 5.8.3.4.

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When the external position is unavailable, the internal GNSS receiver shall be used as a source for AIS position reporting.

When the internal GNSS receiver is performing as a source for AIS position reporting, an appropriate BITE indication shall be output on the presentation interface (see 5.8.1).

The internal GNSS receiver may be capable of being differentially corrected.

Where DGNSS corrections are received from multiple sources, the DGNSS corrections from the nearest DGNSS reference station should be used taking into account the Z count, and the health of the DGNSS reference station.

5.3 User interface

To enable a user to access, select and display the information on a separate system, the AIS SAR airborne station shall be provided with an interface conforming to an appropriate international interface standard.

All interfacing shall be made via the system interface as described in 6.6 (called the "presentation interface").

5.4 Identification

(See 11.1)

For the purpose of station and message identification, the appropriate Maritime Mobile Service Identity (MMSI) shall be used.

The unit shall be supplied with a default MMSI of "000000000" (this is not a valid MMSI).

The unit shall check that any programmed MMSI is between 111200000 and 111799999, otherwise the unit shall reject the programming and be not capable of transmitting. However, a reset to the default value "000000000" shall be accepted, but the unit shall not be capable to transmit with this MMSI.

5.5 Information

(See 11.2)

5.5.1 Information provided by the AIS SAR airborne station

The information provided by the AIS SAR airborne station shall include:

1) Static:

- MMSI;
- call sign and name;
- location of the in use position-fixing antenna on the aircraft if an external position input is implemented.

Static information, voyage related information and the MMSI shall be stored in non-volatile memory.

2) Dynamic:

- position of aircraft referenced to WGS 84 datum with accuracy indication and integrity status;
- time in UTC, the date is established by the receiving equipment;
- course over ground (COG);
- speed over ground (SOG);
- altitude of aircraft, including source.

3) Voyage related:

- optional destination and estimated time of arrival (ETA).

4) Short safety-related messages.

5.5.2 Information reporting intervals

The different information types are valid for a different time period and thus need a different reporting interval.

Static information:	Every 6 min, when data has been amended, and on request.
Dynamic Information:	Every 10 s.
Voyage related information:	Every 6 min, when data has been amended, and on request.
Safety-related message:	As required.

NOTE An SSD or VSD sentence that does not amend the data does not generate a transmission of Message 24 A or Message 5.

The manufacturer can specify further reporting intervals of dynamic information. In this case, the reporting interval in use is set by configuration.

If the autonomous mode requires a shorter reporting interval than the assigned mode, the AIS shall use the autonomous mode reporting interval.

When transmitting on a single channel, the reporting interval shall be maintained by doubling the number of transmissions on the active channel.