Bundesrepublik Deutschland
Federal Republic of Germany

Bundesamt für Seeschifffahrt und Hydrographie
Federal Maritime and Hydrographic Agency

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Conformance test report of an

AIS System

Equipment under test:	Jotron
Type:	TR-8000
Applying test standards:	IEC 61993-2 [Sections 14, 16-21]: 2001
Test Report No.:	BSH/46121/4321890/12-1
Applicant:	Jotron Østbyveien 1 3280 Tjodalyng Norway

Hamburg, 19 April 2012
Federal Maritime and
Hydrographic Agency

by order

Heinrich Bartels
Test engineer

by order

Axel Werth
Deputy
head of section

nach EN ISO/IEC 17025:2005
akkreditiertes Prüflaboratorium

Deutscher Akkreditierungs Rat
DAR
DAT-P-086/98

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DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH
Signatory of the Multilateral Agreement of EA and ILAC for the mutual recognition

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Deutschen AkkreditierungsRat

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The **TGA GmbH,** represented by the **DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH**, confirms that the Testing Laboratory

Federal Maritime and Hydrographic Agency
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Bernhard-Nocht-Straße 78

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is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out testing in the fields of

Marine Equipment (Navigation Equipment, Radio-Communication Equipment, Life-Saving Appliances)

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DAR-Registration No.: **DAT-PL-086/98-02**

Frankfurt/Main, 2008-12-23

Correctness of the english translation confirmed: Frankfurt/Main, 2008-12-23

i.V. Dipl.-Ing.(FH) R. Egner
Head of the Accreditation Body

Member in EA, ILAC, IAF

Translation for information purposes only. The German Accreditation Certificate is authoritative

See notes overleaf

Table of contents:

1 General

1.1 Summary

Applicant:	Jotron, Østbyveien 1, 3280 Tjodalyng, Norway
Equipment under test:	
Type:	TR-8000
Manufacturer:	Jotron, Østbyveien 1, 3280 Tjodalyng, Norway
Place of test:	BSH test laboratory Hamburg, Room 916
Start of test:	08 March 2011
End of test:	08 February 2012

Test standards[1]:

Recommendation ITU-R M.1371-4 (2010)
Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band

IEC 61993-2 (2001)
Maritime navigation and radiocommunication equipment and systems – Automatic Identification Systems
Part 2: Class A shipborne equipment of the Universal Automatic Identification System (AIS) – Operational and performance requirements, methods of test and required test results

IEC 61162-1 Ed. 4.0 (2010) / IEC 61162-2 (1998)
Maritime navigation and radiocommunication equipment and systems – Digital Interfaces
Part 1: Single talker and multiple listeners **/**
Part 2: Single talker and multiple listeners, high speed transmission

Test No.	Reference IEC 61993-2	Section	Result (passed / not passed / not applicable / not tested)
2	14	Operational tests	Passed
3	15	Physical tests	not included
4	16	Specific tests of link layer	Passed
5	17	Specific tests of network layer	Passed
6	18	Specific tests of transport layer	Passed
7	19	Specific presentation interface tests	Passed
8	20	DSC functionality tests	Passed
9	21	Long range functionality tests	Passed

[1] Numbers listed in the titles of the test sections of this report refer to the respective sections of IEC 61993-2 if not stated otherwise.

1.2 Equipment history

For each transponder unit under test a numbered entry is provided here.

1.2.1 EUT system no 1

Transponder				
Type	TR-8000		Part no.	---
Delivery date	2011-06-01		Serial no.	BSH Godjenning 1
HW Version:	Delivery date	2011-06-01	Version no.	
	Installation date	2011-06-01		
SW Version:	Delivery date	2011-06-01	Version no.	01.00.00
	Installation date	2011-06-01		
SW Version:	Delivery date	2011-06-16	Version no.	01.00.01
	Installation date	2011-06-17		
SW Version:	Delivery date	2011-07-08	Version no.	01.00.02
	Installation date	2011-07-11		
SW Version:	Delivery date	2011-11-01	Version no.	01.00.03 SVN revision 1897
	Installation date	2011-11-02		
SW Version:	Delivery date	2011-12-02	Version no.	01.00.04 SVN revision 1998
	Installation date	2012-02-02		
SW Version:	Delivery date	2012-02-07	Version no.	01.00.05-2141
	Installation date	2012-02-08		
SW Version:	Delivery date		Version no.	
	Installation date			

MKD				
Type	Jotron AIS display unit		Part no.	---
Delivery date	2011-06-01		Serial no.	BSH Godjenning 1 0 Serie 1
HW Version:	Delivery date	2011-06-01	Version no.	
	Installation date	2011-06-01		
SW Version:	Delivery date	2011-06-01	Version no.	01.00.00
	Installation date	2011-06-01		SVN revision 1540
SW Version:	Delivery date	2011-11-01	Version no.	01.00.02
	Installation date	2011-11-02		SVN 1893
SW Version:	Delivery date	2011-12-02	Version no.	01.00.04
	Installation date	2012-02-02		SVN 1995
SW Version:	Delivery date	2012-02-07	Version no.	01.00.05
	Installation date	2012-02-08		SVN 2140
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type	GPS Antenna		Part no.	SA-200
Delivery date	2011-06-01		Serial no.	2002707
HW Version:	Delivery date	2011-06-01	Version no.	---
	Installation date	2011-06-01		

1.3 Test environment

Here it is intended to record for which time which EUT system is under test.
The test environment is completely equipped as described in Annex A.

Room	BSH Room 916 (9th floor)
Test engineer	H. Bartels
Location	9°59,103 E 53°32,822 N

Equipment no.	Start of test	End of test	Test engineer
1	2011-06-08	2011-06-20	Bartels
1	2011-07-05	2011-07-15	Bartels
1	2011-11-03	2011-11-22	Bartels
1	2012-02-02	2012-02-06	Bartels
1	2012-02-08	2012-02-08	Bartels

1.4 Composition

Minimum Keyboard and Display (MKD)

☐ Internal ☒ Remote ☐ External

Internal GNSS

☐ Sync only ☒ Backup pos. sensor

1.5 Legend

Result marking (in the "result" column)[2]:

Passed	Item is ok, test was successful
Not passed	Test of a required item was not successful, change required
N/T	Not tested
N/A	Not applicable

Specific remarks (in the "remark" column, marked "***bold italic***"):

REC	Recommendation (in terms of IEC17025 "opinion"): an improvement or change is recommended
Note	Note or comment (in terms of IEC17025 "interpretation"): rationale for specific results or interpretation of requirements as appropriate

Template for additional test notes (copy if required):

Date	Sign	**Result**	**Status**

[2] Test items maybe colour marked in draft versions of the report as follows:

Passed	no colour marking
Not passed	yellow
N/T	blue
N/A	no colour marking
REC	green

1.6 General observations

General observations not specific to any test item of the test standard are listed here:

	General problems		
Date	Item	Remark	Result
2012-02-03 Ba	Sensor input numbers	The sensor numbering of sensor input 1 and 2 in the baud rate setting menu and the port monitor is reversed to the connections defined in the manual and on the equipment at the connector terminals. There is also a discrepancy in the manual itself: On page 53, section 7.3.1.4 Sensor connections: The yellow lines marking sensor 1...3 are according to the software menues but different to the list directly below it. This problem should be clarified to avoid confusion of the users Retest 2012-02-08 Ba: The software has been changed. The baud rate setting menu and the port monitor address the correct sensor port. The manual has been updated. The yellow lines marking sensor 1...3 show the correct sensor ports.	Ok

1.7 4.3 Manuals

1.7.1 Operating and Installation

(60945) Adequate information shall be provided to enable the equipment to be properly operated and maintained by suitable qualified members of a ship's crew:

(60945) Moreover adequate information shall be provided to allow equipment to be installed so that it operates in accordance with the requirements of the relevant equipment standard, taking into account limitations imposed by the operation of other equipment also required to be installed on the bridge.

(61993-2) In addition to the requirements of IEC 60945 clause 14, the manuals shall include:

- *The type of external connector required for connection of the external display as referred to in 7.6.3.2*
- *The needed information for correct siting of the antennas; and*
- *The requirements for external illumination, as appropriate*

It is checked that the required documentation items are available.

2012-02-06 Ba	Test details – General documentation		
Test item	Check	Remark	Result
Composition of customer documentation	Check the composition of customer documentation	The documentation consists of:	
Description of AIS	Check that an general function description of AIS as a new system is included This is not required but recommended in the introduction phase of a new system.	Technical Manual Operator and installation manual	Ok
Operating information	Check that an operating manual is included		Ok
Technical information	Check that an technical manual is included		Ok
Installation information	Check that an installation manual is included	As part of the Operator and installation manual	Ok
Language	Check that the documentation is written in English		Ok
Details of installation information			
System overview	Check that an AIS system overview diagram is available		Ok
Mechanical dimensions	Check that mechanical dimension drawings of transponder are available		Ok
	Check that mechanical dimension drawings of MKD are available		Ok
	Check that mechanical dimension drawings of a Connection box available	Connection box is integrated in the transponder unit	N/A
	Check that mechanical dimension drawings of GPS antenna are available		Ok
	Check that mechanical dimension drawings of VHF antenna are available		Ok

2012-02-06 Ba	Test details – Requirements of IEC 61993-2		
Test item	Check	Remark	Result
Connector of external display	Check that type of connector of external Display is included	A special cable is provided	N/A
Siting of antennas	Check that information about siting the GPS antenna is included		Ok
	Check that information about siting the VHF antenna is included		Ok
RF cable requirements	Check that information about cable requirements for GPS antenna is included		Ok
	Check that information about cable requirements for the VHF antenna is included		Ok
Illumination	Check that information about external illumination is included if required	Not required	N/A

1.7.2 Interface documentation

(61993-2) The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular (see 7.2 19.2 Check of the manufacturer's documentation)

(61162-1; -2) Operator manuals or other appropriate literature provided for equipment that is intended to meet the requirements of this standard shall contain the following information:

a) identification of the A and B signal lines

b) the output drive capability as a talker

c) a list of approved sentences, noting unused fields, proprietary sentences transmitted as a talker and transmission interval for each sentence

d) the load requirements as a listener

e) a list of sentences and associated data fields that are required as a listener

f) the current software and hardware revision if this is relevant to the interface

g) an electrical description of schematic of the listener/talker input/output circuits citing actual components and devices used, including connector type and part number

h) the version number and data of update of the standard for which compliance is sought.

2012-02-06 Ba	Test details – Requirements of Interface documentation		
Test item	Check	Remark	Result
a) A and B signal lines	Check that identification of A and B signal lines is included		Ok

b) Output driver	Check that the output drive capability is included		Ok
c) Talker sentences of PI ports	Check that list of sentences is included		Ok
	Check that unused fields are noted		Ok
c) Talker sentences of long range port	Check that list of sentences is included		Ok
	Check that unused fields are noted		Ok
d) Input load	Check that the input load is included		Ok
e) Input sentences of PI ports	Check that list of sentences is included		Ok
	Check that required and unused fields are noted		Ok
e) Input sentences of long range port	Check that list of sentences is included		Ok
	Check that required and unused fields are noted		Ok
e) Input sentences of sensor inputs	Check that list of sentences is included		Ok
	Check that a list is included for each sensor input if different for the ports	All sensor sentences are accepted at all sensor input ports	Ok
	Check that required and unused fields are noted		Ok
Proprietary sentences	Check that proprietary sentences are listed and described	No proprietary sentences are used	N/A
f) Software version	Check that the relevant software version is included	See Operator manual 2.6: there is an missing reference	Ok
f) Hardware version	Check that the relevant hardware version is included	Information about the software and hardware version for which the manuals are valid have not been found Retest 2012-02-08 Ba: The reference in 2.6 is updated, referencing chapter 1. The Software and hardware version is included in the revision list in chapter 1.	Ok
g) Hardware input/output circuit	Check that information about hardware interface components is included		Ok
h) Standards	Check that the version number and date of update of the relevant standard is included		Ok

2 14 Operational tests

2.1 14.1 Operating modes / Capability

(4.2)

2.1.1 14.1.1 Autonomous mode

(4.2.1, M.1371 A2/3.3.5)

2.1.1.1 14.1.1.1 Transmit position reports

Method of measurement

Set up a test environment of at least 5 test targets. Record the VDL communication and check for messages of the EUT.

Required results

Confirm that the EUT transmits continuously and that the transmitted data complies with sensor inputs.

This is a first more general check that the EUT is continuously transmitting a position report. Special tests regarding

- Reporting rate
- Message contents
- Slot use

are done in special test items.

2011-06-16 Ba	Test details – Transmission of position reports		
Test item	Check	Remark	Result
Navigation status is set to 0 (travelling using engine) Internal GNSS is in use			
MMSI	Check MMSI		Ok
Transmission rate	Check that the message 1 is transmitted continuously		Ok
Position	Check the values of lat and lon		Ok
Speed	Check the values of SOG and COG		Ok
Heading/ROT	Check that the values of heading and ROT are default		Ok

2.1.1.2 14.1.1.2 Receive position reports

Method of measurement

Set up a test environment of at least 5 test targets.

a) Switch on Test targets, then start operation of the EUT

b) Start operation of the EUT, then switch on Test targets

Check the VDL communication and Presentation Interface outputs of the EUT.

Required results

Confirm that EUT receives continuously under conditions a) and b) and outputs the received messages via the PI.

2011-06-16 Ba	Test details – a) Receive Position reports, Target first started		
Test item	Check	Remark	Result
Switch on Test targets, then start operation of the EUT Check the following items on VDM output at PI compared with the transmitted values			
MMSI	Check MMSI		Ok
Transmission rate	Check that the message 1 is received continuously		Ok
Position	Check the values of lat and lon		Ok
Speed	Check the values of SOG and COG		Ok
Heading/ROT	Check the values of heading and ROT		Ok

2011-06-16 Ba	Test details – b) Receive Position reports, EUT first started		
Test item	Check	Remark	Result
Start operation of the EUT, then switch on Test targets Check the following items on VDM output at PI compared with the transmitted values			
MMSI	Check MMSI		Ok
Transmission rate	Check that the message 1 is received continuously		Ok
Position	Check the values of lat and lon		Ok
Speed	Check the values of SOG and COG		Ok
Heading/ROT	Check the values of heading and ROT		Ok

2.1.2 14.1.2 Assigned mode

(4.2.1 M.1371A2/3.3.6)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command msg 16 to the EUT with:

a) Slot offset and increment

b) Designated reporting rate.

Record transmitted messages..

Required results

Confirm that the EUT transmits position reports msg 2 according to defined parameters and reverts to SOTDMA msg 1 with standard reporting rate after 4 to 8 min.

This is a test on operational basis. The details of slot allocation are checked in a special test on link layer (see 4.6.5 16.6.4 Assigned operation). A record of this test can be used for evaluation of this slot allocation test point.

A test if the assigned reporting rate depends on course, speed and navigation status is done in 2.4.3 14.4.3 Assigned reporting rates.

This test is completely covered by test 4.6.5 16.6.4 Assigned operation.

2.1.3 14.1.3 Polled mode

(4.2.1 M.1371A2/3.3.2)

2.1.3.1 14.1.3.1 Transmit an interrogation

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of an interrogation message (msg 15) by the EUT addressing 1 or 2 destinations according to message table (M.1371 table 13) requesting the following responses:

- *msg 3, msg 5 from mobile stations*
- *msg 4, msg 20, msg 22. from base stations*

Record transmitted messages.

Required results

Check that EUT transmits the interrogation message (msg 15) as appropriate.

New ITU requirements:

- *Message 3, 5, 9, 18, 19, 24 from mobile stations*
- *Message 4, 24 from base stations.*

2011-07-11	**Tester: Ba**	**Test details:** Interrogation of message from AIS stations		
Test item		Check	Remark	Result
Request from mobile stations Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,211xxxxxx,3/5/9/18/19724,,,,,,				
Request Message 3		Check the VDO output on PI	2011-06-16 Ba: UTC 08.45 There is no transmission of message 15 2011-07-11 Ba: There is a correct VDO output. This is followed by an incorrect VDO output. In the first test (UTC 12:03:19) it is completely scrambled. In most tests the "$AIV" is missing, the rest of the sentence is correct. In one test there was no additional VDO output. Retest 2011-11-03 Ba: There is only one, correct VDO output	Ok
		Check that the interrogation is transmitted on the channel defined in the AIR sentence	The channel in the AIR sentence is ignored Retest 2011-11-03 Ba: The channel is ignored For Ed.1 this is acceptable but for Ed.2 it will be required	Ok
		Record and check the AIABK acknowledgement	The "ITU-R M.1371 Messsage ID" field should be 15 because the ABK is related to a transmission of a message 15. But it is set according to the requested message type (3 or 5).. Retest 2011-11-03 Ba: The Message ID field is 15 $AIABK,000001028,A,15,,3	Ok
		Check that message is received by the addressed transponder (VDM)		Ok
Request Message 5		Check the VDO output on PI		Ok
		Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Ok
		Check that message is received by the addressed transponder (VDM)		Ok
Request Message 9		Check the VDO output on PI		Ok
		Record and check the AIABK acknowledgement		Ok

Request Message 18	Check the VDO output on PI		Ok
	Record and check the AIABK acknowledgement		Ok
Request Message 19	Check the VDO output on PI		Ok
	Record and check the AIABK acknowledgement		Ok
Request Message 24	Check the VDO output on PI		Ok
	Record and check the AIABK acknowledgement		Ok
Request from a base station Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,00211xxxx,4/24,,,,,,			
Request Message 4	Check the VDO output on PI		Ok
	Record and check the AIABK acknowledgement		Ok
Request Message 24	Check the VDO output on PI		Ok
	Record and check the AIABK acknowledgement		Ok

2011-07-11	**Tester: Ba**	**Test details:** Interrogation with 2 requests		
Test item		Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_35_5.sst: $AIAIR,ID1,3,,5,,ID2,5,,				
VDO output of EUT		Check the VDO output on PI		Ok
AIABK acknowledgement		Record and check the AIABK acknowledgement	$AIABK,<MMSI1>,A,15,,3	Ok
R_X of request		Check that message is received by the VDL analyser		Ok

2011-07-11 Ba	Test details - Interrogation with additional fields (61162-1 Ed. 4)		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence with 4 additional empty fields to the PI. Interrogation sentence: File AIAIR_base_null.sst			
VDO output of EUT	Check the VDO output on PI		Ok
AIABK acknowledgement	Record and check the AIABK acknowledgement		Ok
Transmit an interrogation message 15 by sending an AIR sentence with the additional fields with appropriate values to the PI. Interrogation sentence: File AIAIR_base_value.sst			
VDO output of EUT	Check the VDO output on PI		Ok
	Check that the slot offset values are not used and slot offset = 0		Ok
AIABK acknowledgement	Record and check the AIABK acknowledgement		Ok
RX of request	Check that message is received by the addressed station		Ok

2.1.3.2 14.1.3.2 Interrogation response

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Apply an interrogation message (msg 15; EUT as destination) to the VDL according to message table (M.1371 table13) for responses with msg 3, msg 5 and slot offset set to defined value.

Record transmitted messages and frame structure.

Required results

Check that the EUT transmits the appropriate interrogation response message as requested after defined slot offset. Confirm that the EUT transmits the response on the same channel as where interrogation was received.

The requests with offset > 0 have to be made by the VDL generator, because a mobile transponder cannot generate requests with slot offset.

2011-06-16 Ba	Test details - Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 5, slot offset = 0 (auto select) A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Ok
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Ok
Response on VDL	Check the response on VDL with the VDL analyser, note slot offset	Offset: 36 and 55	Ok
Response channel	Check that the response is transmitted on the request channel		Ok

2011-06-16 Ba	Test details - Interrogation of msg 3		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3 with given slot offset = 10 A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Ok
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Ok
Response on VDL	Check the response on VDL with the VDL analyser		Ok
Slot selection	Check that the slot offset defined in the request is used		Ok

More detailed interrogation tests are made in 6.3 18.2 (M.1371 A1/5.3) Interrogation responses.

2.1.4 14.1.4 Addressed operation

(6.1 M1371 A2/3.3.8)

2.1.4.1 14.1.4.1 Transmit an addressed message

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of an addressed binary message (msg 6; EUT as source) according to message table (M.1371 table 13) by the EUT.

Record the transmitted messages.

Required results

Check that the EUT transmits the msg 6 as appropriate. Repeat test with the addressed safety related message (msg 12).

More detailed tests of addressed message including channel use and transmission retry are made in 6.1 18.1 Addressed messages.

The field contents of this test should be checked in 4.7.2.

2011-06-16 Ba	Test details - Addressed binary message 6		
Test item	Check	Remark	Result
Transmit an addressed binary message 6 by sending an ABM sentence to the PI or alternatively using the MKD PI sentence: File AIABM_bin.sst: !AIABM,1,1,2,00000xxxx,1,6,06P0test,0 A response is automatically transmitted by the addressed transponder .			
VDO output of EUT	Check the VDO output on PI	UTC 08:50	Ok
Channel	Check Tx channel		Ok
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentence		Ok
RX of request	Check that message is received by addressed transponder (VDM)		Ok
Received by VDL Analyser	Check msg on VDL analyser		Ok
TX of ackn. msg 7 (VDO)	Check that ackn msg 7 is transmitted by addressed transponder (VDO)		Ok
Use of Appl. ID	Check for proper use of DAC and FI for text messages when using MKD		Ok
RX of msg 7 (VDM)	Check that the ackn. msg 7 is received by EUT (VDM)		Ok
AIABK acknowledgement		$AIABK,000001028,A,6,2,0	Ok

Add invalid character to encapsulated data, e.g. x,y,z			
Transmission	Check that message is not transmitted	UTC 08:52	Ok
ABK sentence	Check that ABK message with ackn. type 2 (could not be broadcast) is output on PI		Ok
Acknowledgement	Check AIABK or MKD for corresponding pos. and neg. ackn.		Ok

2011-06-16 Ba	Test details - Addressed safety related message 12		
Test item	Check	Remark	Result
Transmit an addressed safety related message 12 by sending an ABM sentence to the PI or alternatively using the MKD . PI sentence: File AIABM_safety.sst: !AIABM,1,1,2,00000xxxx,1,12,D5CD,0 (D5CD = „TEST“). A response is automatically transmitted by the addressed transponder .			
VDO output of EUT	Check the VDO output on PI	UTC 08:54	Ok
Channel	Check Tx on channel A		Ok
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentence		Ok
Received by VDL Analyser	Check msg on VDL analyser		Ok
RX of msg 13 (VDM)	Check that the ackn. msg 13 is received by EUT (VDM)		Ok
Acknowledgement	Check AIABK or MKD for corresponding pos. and neg. ackn.		Ok

2.1.4.2 14.1.4.2 Receive addressed message

(4.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

a) Apply an addressed binary message (msg 6; EUT as destination) to the VDL.

b) Apply an addressed binary message (msg 6; other station as destination) to the VDL.

Record transmitted messages and frame structure.

Required results

Check that EUT transmits the appropriate acknowledgement message. Confirm that

a) EUT outputs the received message via the Presentation Interface.

b) EUT does not output the received message via the Presentation Interface.

Further tests of received addressed messages including acknowledgement see 6.1.2 .

2011-06-16 Ba	Test details - Addressed binary message 6		
Test item	Check	Remark	Result
Transmit an addressed binary message by VDL generator or other Transponder verified by VDL analyser			
Addressed to EUT	Check that VDM output on PI of EUT		Ok
	Check DAC		Ok
	Check FI		Ok
	Check binary data		Ok
Addressed to other AIS transponder	Check that no VDM output on PI or on display of EUT		Ok

2011-06-16 Ba	Test details - Addressed safety related message 12		
Test item	Check	Remark	Result
Transmit an addressed safety related message by VDL generator or other Transponder verified by VDL analyser			
Addressed to EUT	Check that VDM output on PI of EUT	UTC 10:46	Ok
	Check message text		Ok
Addressed to other AIS transponder	Check that no VDM output on PI or on display of EUT		Ok

2.2 14.2 Multiple slot messages

(4.2 M.1371 A2/5.2.1)

2.2.1 14.2.1 5 slot messages

(M.1371 A2 / 5.2.1)

Method of measurement

Apply a BBM sentence to the PI of EUT with a max. of 121 data bytes of binary data in order to initiate transmission of a binary message (msg 8).

Required results

Check that the message is transmitted in up to 5 slots accordingly.

Single slot binary and safety related messages broadcast messages are tested in 6.4 18.3 Broadcast messages

2011-06-16 Ba	Test details - Binary broadcast message 8		
Test item	Check	Remark	Result
Transmit a binary broadcast messages 8 with 121 data bytes of binary data by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_bin.sst: AIS channel for broadcast is 1: (ch A) The file contains 4 BBM sentences with in total 121 data bytes or 162 characters			
VDO output of EUT	Check the VDO output on PI	UTC 10:49	Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,,B,8,6,3	Ok
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
Message on VDL	Check the broadcast message on VDL analyser		Ok
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Ok

2011-06-16 Ba	Test details - Safety related broadcast message 14		
Test item	Check	Remark	Result
Transmit a safety related broadcast messages 14 with 120 data bytes of binary data by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_safety.sst: AIS channel for broadcast is 2: (ch B) The file contains 4 BBM sentences with in total 120 data bytes or 160 characters			
VDO output of EUT	Check the VDO output on PI		Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements		Ok
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
Message on VDL	Check the broadcast message on VDL analyser		Ok
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Ok

2.2.2 14.2.2 Longer messages

(M.1371 A2 / 5.2.1)

Method of measurement

Apply a BBM sentence to the PI of the EUT Presentation Interface with an information content not fitting in 5 slots (i.e. more than 121 data bytes of binary data containing only binary 1's).

Required results

Check that the message is not transmitted. Check that a negative acknowledgement is given on the presentation interface.

2011-06-16 Ba	Test details - Binary broadcast message 8		
Test item	Check	Remark	Result
Transmit a binary broadcast messages 8 with 122 data bytes of binary data, all bits "1", by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_bin_1.sst: AIS channel for broadcast is 1: (ch A) The file contains 4 BBM sentences with in total 121 data bytes or 162 characters			
VDO output of EUT	Check that no VDO is output on PI		Ok
Message on VDL	Check that no message is received by VDL analyser		Ok
AIABK acknowledgement	Record the AIABK output, check that type = 2 (could not be broadcast)		Ok

This test evaluates if the transponder takes into account the actually required amount of bit stuffing and can so transmit longer messages in 5 slots. This is not required.

2011-06-16 Ba	Test details - Binary broadcast message 8		
Test item	Check	Remark	Result
Transmit a binary broadcast messages 8 with 123 data bytes of binary data, not all "1", by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_bin_long.sst: AIS channel for broadcast is 1: (ch A) The file contains 4 BBM sentences with in total 123 data bytes or 164 characters			
VDO output of EUT	Check the VDO output on PI		Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements, type should be 3		Ok
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
Message on VDL	Check the broadcast message on VDL analyser		Ok
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Ok

2.3 14.3 Information content

(6.5.1 M.1371 A2/3.3.8)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

Apply all static, dynamic and voyage related data to the EUT.

Record all messages on VDL and check the contents of position report msg 1 and static data report msg 5.

Required results

Confirm that data transmitted by the EUT complies with manual and sensor inputs.

2.3.1 Information content of msg 1

The dynamic information content of msg 1,2,3 provided by external sensors is checked in detail in 7.5 19.5 Test of sensor input depending on the content and status of the different sensor input sentences 2.1.1.1
Information content provided by internal GNSS receiver – if used as backup position source – and manual MKD inputs are tested here.

2011-06-16 Ba	Test details – content of msg 1		
Test item	Check	Remark	Result
Internal GNSS is in use, no external sensor inputs			
MMSI	Check MMSI and compare with MKD display		Ok
Navigational status	See below		Ok
Position	Check the values of lat and lon and compare with MKD display		Ok
Speed	Check the values of SOG and COG and compare with MKD display	COG = default	Ok
Heading/ROT	Check that the values of heading and ROT are default		Ok
Position accuracy flag	Check PA flag		Ok
Time stamp	Check time stamp		Ok
Comm state	Check for availability, detailed test in 5		Ok
Default values	Check that default values for LAT, LON, SOG, COG are transmitted if internal GNSS is unavailable		Ok

2011-06-16 Ba	Test details – Navigational status		
Test item	Check	Remark	Result
Test of navigational status on VDL message. Check some different navigational status values. Change the navigational status using MKD or VSD input			
Status = 0 (under way using engine)	Check Status in VDL message 1		Ok
Status = 1 (at anchor)	Check Status in VDL message 1		Ok
Status = 7 (fishing)	Check Status in VDL message 1		Ok
Status = 15 (undefined)	Check Status in VDL message 1		Ok
Other status values	Check some other values		Ok

2.3.2 Information content of msg 5

2011-06-16 Ba	Test details – Content of msg 5		
Test item	Check	Remark	Result
Check of the contents of msg 5 (static and voyage related data) Data can be changed using MKD or VSD/SSD input at PI			
MMSI	Check value in msg 5		Ok
AIS version indicator	Check that version is 1		Ok
IMO number	Check value in msg 5		Ok
Call sign	Check value in msg 5		Ok
Name of ship	Check value in msg 5		Ok
Type of ship and cargo type	Check value in msg 5		Ok
Reference point for internal GPS			
Reference point A	Check value in msg 5		Ok
Reference point B	Check value in msg 5		Ok
Reference point C	Check value in msg 5		Ok
Reference point D	Check value in msg 5		Ok
Reference point for EPFS			
Reference point A	Check value in msg 5		Ok
Reference point B	Check value in msg 5		Ok
Reference point C	Check value in msg 5		Ok
Reference point D	Check value in msg 5		Ok
Tx of msg 5	Check if msg 5 is transmitted at change of position source		Ok
Voyage related data			
ETA	Check value in msg 5		Ok
Maximum present static draught	Check value in msg 5		Ok
Destination	Check value in msg 5		Ok
DTE flag can be checked in connection with 2.9.2.5 14.9.2.5 Remote MKD disconnection, when so configured. Check the flag during that test and enter result her			
DTE on	Check that DTE flag = 0		Ok
DTE off	Check that DTE flag = 1		Ok
Type of EPFS			
Apply simulated GLL,VTG, GDT and ROT sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst. Change talker according to test item			
Talker = GP	Check type of EPFS = 1		Ok
Talker = GL	Check type of EPFS = 2		Ok
Talker = GN	Check type of EPFS = 3		Ok
Talker = LC	Check type of EPFS = 4		Ok
Talker = IN	Check type of EPFS = 6		Ok
Talker = other	Check type of EPFS = 0		Ok
Stop external position Use internal GPS	Check type of EPFS = 15		Ok

2.4 14.4 Reporting rates

(6.5.2)

2.4.1 14.4.1 Speed and course change

(6.5.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

a) start with own speed of 10kn; record all messages on VDL for 10min and evaluate reporting rate for position report of EUT by calculating average slot offset over test period.

b) Increase speed and change course (ROT > 10°/min, derived from heading) in accordance with 6.5.2 Table 1 and ITU-R M.1371 A2/4.3.

c) Reduce speed and rotation rate to values below those given in Table 1.

d) Make speed and/or heading sensor unavailable.

For b), c), d) record all messages on VDL and check slot offset between two consecutive transmissions.

Required results

a) Reporting rate shall comply to Table 1 (10sec ±10%).

b) Confirm that the new reporting rate has been established (after 2 transmissions ±20%.)

c) Confirm that the reporting rate is reduced after 4min (speed reduction) or 20sec (ROT reduction).

d) Check that with unavailable sensors the reporting rate reverts to default values (10sec if no sensor connected).

Record the VDL data of the procedure according to the following test items, generate a table and diagram from that data and check the items using the recorded data.

2011-06-08 Ba	Test details – Change of reporting rate by speed		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Record the VDL data of the procedure according to the following test items, generate a table and diagram from that data and check the items using the recorded data. Change speed according to the test items and record VDL data. After each change wait until new reporting rate is clearly established. Lines are related to Excel table reprate_speed.xls			

Speed = 10 kn	Check that reporting rate is 10 s		Ok
Speed = 15 kn	Check slot allocation using msg 3 for new reporting rate		Ok
	Check that slot allocation for the new reporting rate has started after 2 transmissions	The first position report after increasing the speed on both channels is used to start the new reporting schedule	Ok
	Check that new rate is established within 1 minute		Ok
	Check that new reporting rate is 6 s		Ok
Speed = 25 kn	Check slot allocation using msg 3 for new reporting rate		Ok
	Check that slot allocation for the new reporting rate has started after 2 transmissions	The first position report after increasing the speed on both channels is used to start the new reporting schedule	Ok
	Check that new rate is established within 1 minute		Ok
	Check that new reporting rate is 2 s		Ok
Reduction of speed to Speed = 15 kn	Check slot allocation by deallocation of slots, Msg 3 not required for new reporting rate		Ok
	Check that new rate starts after 3 min and is established within 4 minutes		Ok
	Check that new reporting rate is 6 s		Ok
Reduction of speed to Speed = 10 kn	Check slot allocation using msg 3 for new reporting rate		Ok
	Check that new rate starts after 3 min and is established within 4 minutes		Ok
	Check that new reporting rate is 10 s		Ok

2011-06-08 Ba	Test details – Change of reporting rate by heading		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Record the VDL data of the procedure according to the following test items, generate a table and diagram from that data and check the items using the recorded data. Change speed according to the test items and record VDL data. After each change wait until new reporting rate is clearly established. Lines are related to Excel table reprate_speed.xls			
Change of heading from 359°to 0°	Check that the reporting rate is not increased		Ok
Change of heading from 0° to 359°	Check that the reporting rate is not increased		Ok
Speed = 10 kn Heading = 0	Check that reporting rate is 10 s		Ok
Speed = 10 kn Increase heading by 10 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate	- Additional messages are inserted between the basic position reports - It seems that the SI for the additional messages is one SI too early. The actual SI ends at the time when the SI should begin. <u>Retest 2011-07-13 Ba:</u> The SI is correct	Ok Ok
	Check that new rate is established immediately (within 150 slots)		Ok
	Check that new reporting rate is 3 1/3 s		Ok
Speed = 10 kn Stop Increasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)		Ok
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change		Ok
	Check that new reporting rate is 10 s again		Ok

Speed = 15 kn	Wait until speed is 6 s with msg type 1		
Speed = 15 kn Decrease heading by 10 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate	- Additional messages are inserted between the basic position reports - It seems that the SI for the additional messages is one SI too early. The actual SI ends at the time when the SI should begin. Retest 2011-07-13 Ba: The SI is correct	Ok Ok
	Check that new rate is established immediately (within 150 slots)		Ok
	Check that new reporting rate is 2 s		Ok
Speed = 15 kn Stop decreasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)		Ok
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change		Ok
	Check that new reporting rate is 6 s again		Ok
Speed = 25 kn	Wait until speed is 2 s with msg type 1		
Speed = 25 kn Increase heading	Check that there is no change	Test 2011-06-16 Ba: UTC 12:24	Ok
Speed = 25 kn Stop Increasing heading	Check that there is no change		Ok

2011-06-16 Ba	Test details – Reporting rate - Sensor unavailable		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Change speed according to the test items and record VDL data.			
Speed = 10 kn	Check that reporting rate is 10 s		Ok
Speed = 15 kn	Check that reporting rate is 6 s		Ok
Speed sensor unavailable (internal source made unavailable)	Record time from stopping speed input to reverting report rate	UTC 12:13 The reporting interval is changed to 10 s 3 min after speed loss.	Ok
	Check that new reporting rate is 10 s	Remark:	Ok

Note: 61993 differs to 1371 clarifications with regard to behaviour when speed sensor unavailable

2.4.2 14.4.2 Change of navigational status

(6.5.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Change Navigational status by applying voyage data message to the Presentation Interface of the EUT.

a) set NavStatus to "at anchor" and speed <3 kn

b) set NavStatus to "at anchor" and speed >3 kn

c) set NavStatus to other values

Record all messages on VDL and evaluate reporting rate of position report of EUT.

Required results

a) Reporting rate shall be 3 min.

b) Reporting rate shall be 10 s.

c) Reporting rate shall be adjusted according to speed and course (see 14.4.1)

2011-06-16 Ba	Test details – Reporting rate		
Test item	Check	Remark	Result
Apply simulated sensor data to the sensor input. File name is ais01_gll_vtg_hdt_rot.sst Change Navigation status and speed according to test items			
Navigation status = 0 (under way using engine Speed = 2 kn	Check that reporting rate is 10 s		Ok
Nav. status = 1 (at anchor) Speed = 2 kn	Check that reporting rate is 3 min		Ok
	Check that the position report is interleaved with the msg 5	The position report is not interleaved with message 5 See ITU-R M.1371 A2 4.3.1.3 Retest 2011-07-14 Ba: The position report is interleaved with message 5.	Ok
Nav. status = 1 Speed = 4 kn	Check that reporting rate is 10 s	UTC 11:42	Ok
Nav. status = 5 (moored) Speed = 2 kn	Check that reporting rate is 3 min		Ok
Nav. status = 2 (not under command) Speed = 2 kn	Check that reporting rate is 10 s	UTC 10:44	Ok
Nav. status = 6 (Aground) Speed = 2 kn	Check that reporting rate is 10 s min	UTC 11:48	Ok
Nav. status = 3 or other Speed = 2 kn	Check that reporting rate is 10 s	UTC 11:51	Ok

Note) According to ITU-R M1371 §4.3.1.3 “When the vessel is at anchor, moored, not under command or aground, which is indicated by the navigational status, ...Message 3 should be used with a reporting rate of 3 minutes.”
On the other hand in table 1 of IEC 6193-2 only “at anchor” and “Moored” is mentioned for a reporting rate of 3 min.

2011-06-09 Ba	Test details – Check of slot handling		
Test item	Check	Remark	Result
Apply simulated sensor data to the sensor input. File name is ais01_gll_vtg_hdt_rot.sst Change Navigation status according to test items			
Navigation status = 0 (under way using engine Speed = 2 kn	Check that reporting rate is 10 s		Ok
Change Nav status to “at anchor”	Check that the used slots are release by time-out 0 and slot offset = 0		Ok
	Check that the position reports are transmitted in ITDMA mode using msg 3		Ok
Change Nav status back to 0	Check that a procedure like network entry is performed		Ok

2.4.3 14.4.3 Assigned reporting rates

(6.5.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command msg 16 to the EUT with:

a) initial slot offset and increment;

b) designated reporting rate.

Change course, speed and NavStatus. Record transmitted messages.

Required results

Confirm that the EUT transmits position reports msg 2 according to the parameters defined by msg 16; the reporting rate shall not be affected by course, speed or NavStatus. The EUT shall revert to msg 1 or 3 in autonomous mode with standard reporting rate after 4 to 8 min.

If the autonomous mode requires a higher reporting rate than that directed by Message 16, the Class A shipborne mobile AIS station should use the autonomous mode.

More detailed tests are made in 4.6.5 16.6.4 Assigned operation

In this test it is only checked if the assigned reporting rate depends on course, speed and navigation status.

Only if the speed or course change requires an higher report rate the EUT has the revert to autonomous mode and obtain the higher report rate.

2011-06-17 Ba	Test details a) – Slot offset and increment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset A = 40 (offset to first assigned slot = 40) and slot increment parameter = 3 (increment = 225 = 6 s)			
NavStatus = 0 (under way using engine), Speed = 10 kn • Send assignment cmd	Check that slot offset = 225 and reporting rate is 6 s And msg type = 2	Test 2011-06-20 Ba: UTC 12:00	Ok
In assigned mode • change NavStatus to 1 (at anchor)	Check that Navstatus has no effect: EUT maintains assigned mode		Ok
In autonomous mode: NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd	Check that the assignment command is accepted	Test 2011-06-20 Ba: UTC 12:10	Ok
Nav Status = 0, speed = 10 kn • Send assignment	Check that assignment command is executed	Test 2011-06-20 Ba: UTC 11:50	Ok
• Increase speed to 15 kn	Check that EUT maintains assignment mode	Test 2011-06-20 Ba: UTC 11:52	Ok
• Increase speed to 25 kn	Check that EUT increases reporting rate to 2 s and		Ok
	Check if msg type = 1 or msg type 2 is used (rescheduling with msg 3)		Ok
NavStatus = 0, Speed = 15 kn: • Send assignment cmd	Check that EUT changes to assigned mode		Ok
In assigned mode: • Change heading	Check that reporting rate is increased to 2 s		Ok
	Check the method of increasing the reporting rate (msg 3 inserted between msg 1 or 2)		Ok

2011-06-17 Ba	Test details b) – Rate assignment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset = 100 (reporting rate = 100 msg/10 min), increment=0			
NavStatus = 0 (under way using engine), Speed = 10 kn • Send assignment cmd	Check that slot offset = 225 and reporting rate is 6 s And msg type = 2	Test 2011-06-20 Ba: UTC 12:24	Ok
In assigned mode • change NavStatus to 1 (at anchor)	Check that Navstatus has no effect: EUT maintains assigned mode	Test 2011-06-20 Ba: UTC 12:26	Ok
In autonomous mode: NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd	Check that the assignment command is accepted	Test 2011-06-20 Ba: UTC 12:18	Ok
Nav Status = 0, speed = 10 kn • Send assignment	Check that assignment command is executed	Test 2011-06-20 Ba: UTC 11:27	Ok
• Increase speed to 15 kn	Check that EUT maintains assignment mode	Test 2011-06-20 Ba: UTC 11:29	Ok
• Increase speed to 25 kn	Check that EUT increases reporting rate to 2 s and		Ok
	Check if msg type = 1 or msg type 2 is used (rescheduling with msg 3)	Message type = 1	Ok
NavStatus = 0, Speed = 15 kn: • Send assignment cmd	Check that EUT changes to assigned mode		Ok
In assigned mode: • Change heading	Check that reporting rate is increased to 2 s		Ok
	Check the method of increasing the reporting rate (msg 3 inserted between msg 1 or 2)		Ok

2.4.4 14.4.4 Static data reporting rates

(6.5.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

a) Record the transmitted messages and check for static and voyage related data (msg 5).

b) Change static and/or voyage related station data. Record the transmitted messages and check for static and voyage related data (msg 5).

Required results

a) Confirm that the EUT transmits msg 5 with a reporting rate of 6 min.

b) Confirm that the EUT transmits msg 5 within 1 min reverting to a reporting rate of 6 min.

2011-06-16 Ba	Test details - Static data reporting rates		
Test item	Check	Remark	Result
Record msg 5 and check repetition rate			
a) Default update rate	Check that update rate is 6 min		Ok
b) Change static data using SSD sentence short time after regular msg 5	Check that msg 5 is transmitted within 1 min		Ok
	Check that msg 5 is transmitted only if an item has been changed		Ok
Change voyage related data using VSD sentence	Check that msg 5 is transmitted within 1 min		Ok
	Check that msg 5 is transmitted only if an item has been changed		Ok
Change static data using MKD	Check that msg 5 is transmitted within 1 min		Ok
Change position source with different ref. point data (see 61993 6.10.3.4)	Check that msg 5 with ref point of new source is transmitted before next transmission of pos. Report If this is not done before next transmission of position report there will be a position jump on the display system of near targets.		Ok

2.5 14.5 Security

(6.6)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Switch the EUT off for more than 15 min and on again at least ten times. Recover and readout recorded data.

Required results

Confirm that the EUT records and displays times and events correctly.

2011-07-14 Ba	Test details - Security		
Test item	Check	Remark	
Switch EUT off for 16 minutes and on again			
Read out means	Check that there are means to readout recorded data	Displayed on MKD	Ok
Read out recorded data	Check that all switch off times > 15min are correctly recorded		Ok
If the EUT supplies a "silent mode" (no transmission)	Check that all silent mode times > 15min are correctly recorded	UTC 11:54 ... 12:43 UTC 13:21 ... 13:48 Silent mode by ACA input. It is not displayed in the security log Retest 2011-11-03 Ba: The silent mode by ACA is displayed in the security log	Ok

2.6 14.6 Initialisation period

(6.7 M.1371 A2/3.3.3)

Method of measurement

Set up standard test environment with all sensors available.

a) Switch on EUT with EUT operating in autonomous mode.

b) Switch off EUT for approx. 0.5 s. Record transmitted messages.

Required results

Confirm that the EUT starts transmissions within 2 min after switch on.

2011-07-14 Ba	Test details - Initialisation period		
Test item	Check	Remark	Result
Set up standard test environment with all sensors available			
a) Switch on of EUT	Check that EUT starts transmission within 2 min		Ok
b) Switch off EUT for approx. 0.5 s	Check that EUT starts transmission within 2 min	UTC 13:57 Tx after 1:26 min	Ok
Set the EUT to the default MMSI (normally 000000000)			
Switch on EUT	Check that EUT does not start transmission	UTC 14:00	Ok

2.7 14.7 Channel selection

(6.9)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Switch the EUT to different channels randomly selected from the maritime mobile band as specified by ITU-R M.1084-4, Annex 4 using both 25kHz and 12.5kHz channel spacing (incl. 12.5kHz emission on a 25kHz channel):

a) manually,

b) by transmission of channel management message (msg 22) broadcast and addressed to EUT,

c) by application of ACA sentence to the presentation interface.

d) By transmission of DSC telecommand to EUT

Record the VDL messages.

Required results

Confirm that the EUT switches to Channel / bandwidth and duplex / simplex channels accordingly.

Confirm that the EUT delivers a TXT-sentence with ID 036, followed by the ACA-sentences needed to inform of changes in the AIS use of regional operating settings.

Remark: Because 12.5 kHz bandwidth has been removed in ITU-R M.1371-3 the test is performed only with 25 kHz bandwidth.

2011-11-16 Ba	Test details - Channel selection		
Test item	Check	Remark	Result
Select channels and bandwidth according to the test items in a regional area around the actual position so that is in use. The VDL analyser has to be switched to the selected channels			
a) Enter manually: 2 simplex channels 25 kHz spacing Upper band	Check that channels are used		Ok
	Check TXT output at PI		Ok
	Check ACA output at PI	There is no ACA output UTC 13:18 On query the correct ACA sentence is output Retest 2012-02-02 Ba: There is a correct ACA output	Ok
b) Enter by using msg 22: 1 duplex channel 25 kHz spacing	Check that channels are used		Ok
	Check TXT output at PI		Ok
	Check ACA output at PI		Ok
c) Enter by ACA sentence: 2 simplex channels upper and lower band	Check that channels are used		Ok
	Check TXT output at PI	UTC 13:21	Ok
	Check ACA output at PI		Ok
d) Enter by DSC 2 simplex channels lower band	Check that channels are used	Test 2011-11-18	Ok
	Check TXT output at PI		Ok
	Check ACA output at PI		Ok

2.8 14.8 Transceiver protection

(6.9 ; M.1371 A2/2.14, 2.15)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Open circuit and short circuit VHF-antenna terminals of the EUT for at least 60 s each.

Required results

The EUT shall be operative again within 2 min after refitting the antenna without damage to the transceiver.

2011-11-16 Ba	Test details - Transceiver protection		
Test item	Check	Remark	Result
Open circuit of VHF antenna terminal	Check that EUT starts transmission within 2 min after refitting the antenna	UTC 13:33 refitting The next scheduled transmission is transmitted	Ok
Short circuit of VHF antenna terminal	Check that EUT starts transmission within 2 min after refitting the antenna		Ok

2.9 14.9 Alarms and indicators, fall-back arrangements

(6.10)

2011-11-16 Ba	Test details - General alarm tests		
Test item	Check	Remark	Result
No alarm pending			
Alarm output repetition	Check that ALR sentences are not output with a repetition rate < 1 min	There is an empty ALR sentence every 93 s	Ok

2.9.1 14.9.1 Loss of power supply

(6.10.1.2)

Method of measurement

Disconnect power supplies of the EUT.

Required result

Verify that the relay output is "active" when the power is "off".

2011-11-16 Ba	Test details - Loss of power supply		
Test item	Check	Remark	Result
Switch off power supply	Check that alarm relay output is active.	The alarm relay is not activated. Retest 2012-02-02 Ba: The active state is the open relay contact state. This is according to IEC 61993-2 §6.10.2.3. The relay contact is open = active at power off. In all other active alarm conditions the contact is also open.	Ok

2.9.2 14.9.2 Monitoring of functions and integrity

(6.10.2)

2.9.2.1 14.9.2.1 Tx malfunction

Method of measurement

Disable the transmitter by disconnecting the antenna.

Required result

Verify that an alarm sentence ALR with alarm ID 001 is sent and the relay output signals the failure state.

Verify that relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated.

Alternatively an ALR 001 when TX active between TX-slots is accepted; disconnecting antenna is also alarmed by ALR 002.

2011-11-16 Ba	Test details - Tx malfunction		
Test item	Check	Remark	Result
Disconnect VHF antenna or: make TX active between scheduled slots (e.g. CW carrier)			

ALR output	Check that ALR sentence ID 001 is output at PI	There is only an Alarm ID 2 The alarm ID field is incorrect. IEC 61162-1 defines it as a 3 character field but it is output as 1 character "2" only, it should be "002". UTC 14:47 Retest 2012-02-02 Ba: The alarm ID is output as 3 characters ("002").	Ok Ok
ALR output repetition	Check that the ALR sentence is repeated with a rate of 30 s		Ok
Alarm relay	Check that alarm relay is activated		Ok
MKD display	Check that the alarm is displayed on the MKD		Ok
Send an ACK sentence	Check that alarm relay deactivated	UTC 14:49	Ok
	Check that ALR sentence is updated		Ok
	Check that alarm display on the MKD is updated	The popup window is not removed from the screen. We recommend to remove the popup window from the MKD screen when the alarm has been acknowledged on the PI port. Retest 2012-02-02 Ba: The popup window is removed	 Ok
Reconnect VHF antenna	Check that ALR sentence is updated		Ok
	Check that alarm display on the MKD is updated	The alarm is removed from the list of active alarms	Ok

2.9.2.2 14.9.2.2 Antenna VSWR

Method of measurement

Prevent the EUT from radiating with full power by mismatching the antenna for a VSWR of 3:1. During the mismatch the output power is not required to be at the rated output power.

Required result

Verify that the EUT continues transmitting. Verify that an alarm sentence ALR with alarm ID 002 is sent and the relay output signals the failure state.

Verify that relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated.

2011-11-16 Ba	Test details - Antenna VSWR		
Test item	Check	Remark	Result
Connect a mismatched dummy load with a VSWR of 3:1 to the VHF antenna terminal			
Continuation of Tx	Check that transmission continues		Ok
ALR output	Check that ALR sentence ID 002 is output at PI	See 14.9.2.1	Ok
MKD display	Check that the alarm is displayed on the MKD		Ok
Alarm relay	Check that alarm relay is activated		Ok
Send an ACK sentence	Check that alarm relay deactivated		Ok
	Check that ALR sentence is updated		Ok
	Check that alarm display on the MKD is updated	The popup window is not removed from the screen. We recommend to remove the popup window from the MKD screen when the alarm has been acknowledged. Retest 2012-02-02 Ba: The popup window is removed	Ok
Generate a new alarm by connection the VHF antenna and again connect the mismatched dummy load			
Acknowledge the alarm on MKD (applies to all alarms) note: NEW	Check that alarm relay deactivated		Ok
	Check that ALR sentence is updated		Ok
	Check that alarm display on the MKD is updated (the alarm indication is cleared)		Ok
Connect VHF antenna	Check that ALR sentence is updated		Ok

2.9.2.3 14.9.2.3 Rx malfunction

Manufactures shall provide documentation describing how the AIS detects Rx malfunction and that an ALR sentence with alarm ID as appropriate is sent.

2012-02-06 Ba	Test details - Rx malfunction		
Test item	Check	Remark	Result
Check the documentation			
Detection of RX malfunction	Check that documentation describes how the AIS detects Rx malfunction	Short description: the PLL lock lost condition activates the alarm	Ok
ALR output	Check that documentation describes that an ALR sentence with ID 003 (RX1), ID 004 (RX2) and ID 005 (DSC) is sent.		Ok

2.9.2.4 14.9.2.4 Loss of UTC

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Disconnect the GNSS antenna (UTC clock lost).

Required result

Verify that the system continues to operate but changes to indirect synchronisation and that an TXT-sentence with ID 007 is sent and the relay output is not activated.

2011-11-16 Ba	Test details - UTC clock lost		
Test item	Check	Remark	Result
Disconnect GNSS antenna			
Continuation of operation	Check that transmission of position report continues	UTC 15:05	Ok
Synchronisation	Check that EUT switches to indirect synchronisation		Ok
TXT output	Check that a TXT sentence with ID 007 is output at PI	There is an ALR ID 007 output This is accepted because it is according to Ed. 2	Ok
Alarm relay	Check that the alarm relay output is not activated	The alarm relay is activated. This is according to the ALR output. This is accepted because it is according to Ed. 2	Ok
MKD display	Check that the status display of the MKD is updated	The status display is not affected because it is an alarm. The alarm list is updated	Ok

2.9.2.5 14.9.2.5 Remote MKD disconnection, when so configured

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

a) Disconnect the connection to the remote MKD.

b) Provide an alarm acknowledgement, ACK sentence with ID 008, to the PI.

Required result

a) Verify that an alarm sentence, alarm ID 008, is sent and the relay output signals the failure. Verify that the AIS continues operation, with the DTE value "1" in msg 5.

b) Verify that the relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated.

2011-11-16 Ba	Test details - Remote MKD disconnection		
Test item	Check	Remark	Result
Disconnect the connection to the remote MKD.			
Continuation of Tx	Check that transmission continues	UTC 15:10	Ok
DTE flag	Check that the DTE flag in msg 5 is set to 1		Ok
ALR output	Check that ALR sentence ID 008 is output at PI		Ok
Alarm relay	Check that alarm relay is activated		Ok
MKD display	Check that loss of connection to the transponder is displayed on the MKD	There is a red top line “No connection to transponder unit”	Ok
Send an ACK sentence	Check that alarm relay deactivated		Ok
	Check that ALR sentence is updated		Ok
Reconnect MKD	Check that ALR sentence is updated	UTC 15:16	Ok
	Check that the DTE flag in msg 5 is set to 0	The DTE flag is 1 if the SSD sentence has applied a DTE flag = 1. The DTE flag is 0 if the SSD sentence has applied a DTE flag = 0. See Note) Retest 2012-02-02 Ba: The DTE flag is 0 if the MKD is connected.	Ok
MKD display	Check that the MKD display is updated		Ok

Note)
The DTE flag should indicate if there is a device available which can display text messages.

If the MKD is available there is a device which can display test messages, so the DTE flag should be set to 0, independent of the SSD input. It can be ignored that the external device indicates that it is not able to display text messages because the MKD can do it.

In my opinion it is a “or” connection for DTE flag = 0 between SSD input and MKD. If either the external equipment or the MKD (or both) can display text messages the DTE flag should be set to 0.

2.9.3 14.9.3 Monitoring of sensor data

(6.10.3)

2.9.3.1 14.9.3.1 Priority of position sensors

(6.1.1.3, 6.10.3)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Verify the manufacturer's documentation to ascertain the configuration implemented on the EUT for position sensors (see 6.2).

Apply position sensor data in a way that the EUT operates in the states defined below :

a) external DGNSS in use (corrected)

b) internal DGNSS in use (corrected; msg 17) if implemented

c) internal DGNSS in use (corrected; beacon) if implemented

d) external EPFS in use (uncorrected)

e) internal GNSS in use (uncorrected) if implemented

f) no sensor position in use

Check the ALR sentence and the position accuracy flag in the VDL msg 1.

Required result

Verify that the use of position source, position accuracy flag, RAIM flag and position information complies to Table 4.

Verify that when the status is changed, an ALR (025, 026, 029, 030), or TXT (021, 022, 023, 024, 025, 027, 028) sentence is sent according to table 2 or table 3 respectively.

Verify that the status is changed after 5 s when switching downwards and 30 s when switching upwards.

2011-07-05 Ba	Test details - Position priority – Basic test without internal DGNSS		
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: no RAIM			
No sensor data: Changing upwards			
f) Start with: • No external GNSS input • No Internal GNSS	Check that default position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 0		Ok
	Check that ALR message with ID 026 (No sensor position) is output on PI every 30 s		Ok
e) Change from f: • No external GNSS input • Activate internal GNSS	Check that internal position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is according to internal sensor (= 1)	RAIM flag = 0 RAIM function is required for the internal GNSS Retest 2011-11-16 Ba: RAIM-flag = 1	Ok

	Check that msg 5 is output with new (internal) ref. point		Ok
	Check that ALR message with ID 026 is updated		Ok
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that the alarm on MKD according to ALR ID 026 is updated		Ok
	Check that status display of MKD is updated according to TXT ID 025 and ID 028	See Note) Retest 2011-11-16 Ba: The status is displayed correctly	Ok
	Check that status has been changed after 30 s	46 s after status change (16 s aqu. Time and 30 s time-out)	Ok
d) Change from e: • Internal GNSS is available • Apply external GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is according external sensor (=0)		Ok
	Check that msg 5 is output with new (external) ref. point		Ok
	Check that ALR message with ID 025 is updated	4 s after status change	Ok
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Ok
	Check that the alarm on MKD according to ALR ID 025 is updated		Ok
	Check that status display of MKD is updated according to TXT ID 022 and ID 027	See Note) Retest 2011-11-16 Ba: The status is displayed correctly	Ok
	Check that status has been changed after 30 s		Ok
a) Change from d: • Internal GNSS • Change external mode to DGNSS	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that no message 5 is transmitted	Message 5 is transmitted This is not necessary because the reference point has not changed Retest 2011-11-16 Ba: Message 5 is not transmitted	Ok
	Check that TXT sentence with ID 021 is output on PI		Ok

	Check that status display of MKD is updated according to TXT ID 021	See Note) Retest 2011-11-16 Ba: The status is displayed correctly	Ok
	Check that status has been changed after 30 s		Ok
Highest Level: Changing downwards			
d) Change from a: • Internal GNSS available • Change external sensor mode to GNSS	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that no message 5 is transmitted	Message 5 is transmitted This is not necessary because the reference point has not changed Retest 2011-11-16 Ba: Message 5 is not transmitted	Ok
	Check that TXT sentence with ID 022 is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentence	See Note) Retest 2011-11-16 Ba: The status is displayed correctly	Ok
	Check that status has been changed after 5 s		Ok
e) Change from d: • Internal GNSS available • Remove external GNSS input	Check that internal position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set	RAIM flag = 0 Retest 2011-11-16 Ba: RAIM-Flag = 1	Ok
	Check that msg 5 is output with new ref. point		Ok
	Check that ALR message with ID 025 (external EPFS lost) is output on PI		Ok
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that an alarm according to ALR message is displayed on MKD		Ok
	Check that status display of MKD is updated according to TXT sentence	See Note) Retest 2011-11-16 Ba: The status is displayed correctly	Ok
	Check that status has been changed after 5 s		Ok
f) Change from e: • No external GNSS input • Disable internal GNSS	Check that default position is used		Ok

	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 0		Ok
	Check that no message 5 is transmitted	Message 5 is transmitted This is not necessary because the reference point has not changed Retest 2011-11-16 Ba: Message 5 is not transmitted	Ok
	Check that ALR message with ID 026 (No sensor position) is output on PI		Ok
	Check that an alarm according to ALR message is displayed on MKD		Ok
	Check that status has been changed after 5 s		Ok

Note)
There is a list of the last 9 TXT messages, without time indication.

This is not helpful for the operator. It is the purpose of the status display to display the current status of the unit. After a few changes of e.g. the differential mode all other TXT message disappear.

Therefore for each of the following groups exact one line should be displayed:

Position sensor
The current position sensor status is derived from the last received sentence of the following sentences:

Format	ID	Description
TXT	025	Internal GNSS in use
TXT	022	External GNSS in use
TXT	023	Internal DGNSS in use (beacon)
TXT	024	Internal DGNSS in use (message 17)
TXT	021	External DGNSS in use
ALR	026	No sensor position in use

Speed sensor
The current speed sensor status is derived from the last received sentence of the following sentences:

Format	ID	Description
TXT	028	Internal SOG/COG in use
TXT	027	External SOG/COG in use
ALR	029 and 030	No valid SOG information No valid COG information

Heading sensor
The current position sensor status is derived from the last received sentence of the following sentences:

Format	ID	Description
TXT	031	Heading valid
ALR	032	Heading lost/invalid

ROT sensor
The current position sensor status is derived from the last received sentence of the following sentences:

Format	ID	Description
TXT	033	Rate of Turn Indicator in use
TXT	034	Other ROT source in use
ALR	035	No valid ROT information

UTC clock
The current position sensor status is derived from the last received sentence of the following sentences:

Edition 1 version

Format	ID	Description
TXT	007	UTC clock lost
VDO	MSG 1,2,3 Sync mode = 0	UTC clock ok There is no TXT sentence defined for „UTC clock ok“

Edition 2 version

Format	ID	Description
ALR	007	UTC clock lost

2011-11-16 Ba	Test details - Position priority –DGNSS test Msg 17		
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: no RAIM			
No correction data: Changing upwards			
d) Start with: • Internal GNSS is available • External GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 0		Ok
b) Change from d: • External mode is GNSS • Apply correction data by msg 17	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that RAIM flag is set according to internal GNSS (=1)		Ok
	Check that msg 5 is output with new (internal) ref. point		Ok
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 024 and 028		Ok
	Check that status is changed after 30 s		Ok

a) Change from b: • Change external mode to DGNSS • Internal DGNSS (msg 17)	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that RAIM flag is set according to external GNSS (=0)		Ok
	Check that msg 5 is output with new (external) ref. point	In one of 3 tests there was no transmission of message 5 (see log file Jotron_14_9_3_1_msg17_t1.sst, UTC 10:33:30 Retest 2012-02-03 Ba: In 4 repetitions of the test there was no missing message 5 at change of the position source from external to internal or from internal to external	Ok
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 021 and ID 027		Ok
	Check that status is changed after 30 s		Ok
Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by msg 17 • Change external sensor mode to GNSS	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentences		Ok
	Check that status is changed after 5 s		Ok
d) Change from c: • External GNSS input • Remove msg 17 (correction data for Internal GNSS)	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that flag is set according to external sensor input data (=0)		Ok
	Check that msg 5 is output with new ref. point		Ok

	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI	In addition to the correct TXT with ID 022 and 027 there is an incorrect TXT output ID 023 “Internal DGNSS in use beacon” about 8 s after end of messages 17 Retest 2012-02-03 Ba: There was no unexpected TXT message ID 023. In 3 of 4 tests there was an ALR 007 UTC sync invalid for about 2 s at the end of the use of correction data, a few seconds before changing to external position. This incorrect alarm will annoy the operators Retest 2012-02-08 Ba: There is no ALR 007 at the end of the use of correction data.	Ok Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
	Check that status is changed after 5 s + max age of correction data	Max age = 1 min, status is changed after 1 min 5 s	Ok

2011-11-16 Ba	Test details - Position priority –DGNSS test beacon		
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: No RAIM.			
No correction data: Changing upwards			
d) Start with: • Internal GNSS is available • External GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 0		Ok
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (internal) ref. point		Ok
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 023 and 028		Ok
a) Change from C: • Change external mode to DGNSS • Internal DGNSS (beacon)	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (external) ref. point		Ok
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 021		Ok
Status change time	Check that status is changed after 30 s		Ok
Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by beacon • Change external sensor mode to GNSS	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
d) Change from c: • External GNSS input • Remove beacon correction data for Internal GNSS	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to sensor input data		Ok

	Check that msg 5 is output with new ref. point		Ok
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
Status change time	Check that status is changed after 5 s		Ok

2011-11-16 Ba	Test details - Position priority –DGNSS test beacon + Msg 17		
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: No RAIM.			
No correction data: Changing upwards			
d) Start with: • Internal GNSS is available • External GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 0		Ok
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (internal) ref. point		Ok
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 023		Ok
b) Change from c: • External mode is GNSS • Correction data for DGNSS by beacon • Apply msg 17 with correction data	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 024 is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 024		Ok
a) Change from b: • Change external mode to DGNSS • Internal DGNSS (msg17)	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (external) ref. point		Ok
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 021		Ok
Status change time	Check that status is changed after 30 s		Ok

Highest Level: Changing downwards			
b) Change from a: • Msg 17 for internal DGNSS • Internal DGNSS by beacon • Change external sensor mode to GNSS	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
c) Change from b: • External sensor mode is GNSS • Internal DGNSS by beacon • Stop msg 17	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 023 is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
d) Change from c: • External GNSS input • Remove beacon correction data for internal GNSS	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to sensor input data (=0)		Ok
	Check that msg 5 is output with new ref. point		Ok
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
Status change time	Check that status is changed after 5 s		Ok

2.9.3.2 14.9.4 Heading sensor

(6.10.3.1)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

a) Disconnect the inputs for HDG and ROT or set their data to invalid (e.g. by wrong checksum, "valid/invalid" flag).

b) Reconnect the inputs for HDG and ROT

c) Disconnect the input for ROT or set the data to invalid (e.g. by wrong checksum, "valid/invalid" flag). Establish a rate of heading change that is greater than 5 degrees in 30 seconds

d) Reconnect the ROT input

Required Result

a) Check that an alarm sentence ALR with alarm ID 032 for invalid HDG and an alarm sentence ID 035 for invalid ROT are sent to the PI and the "default" data is sent in VDL msg 1,2 or 3.

b) Check that an alarm sentence ALR with alarm ID 031 for valid HDG and ID 033 for valid ROT is sent to the PI . Verify that, in the alarm sentences, the alarm condition flag is set to "V" and that the relay output is not activated. Check that TXT-sentences with ID 031 for valid HDG and ID 033 for ROT indicator in use are sent to the PI

c) Check that TXT-sentence with ID 034 for "other ROT source in use" is sent to the PI and that the contents of the message's ROT field is the correct "direction of turn" (table 5 "ROT sensor fallback conditions," Priority 2).

d) Check that a TXT-sentence with ID 033 for ROT indicator in use is sent to the PI.

2011-07-05 Ba	Test details - Heading and ROT		
Test item	Check	Remark	Result
Connect Heading and ROT input according to test items			
Start with: • Valid heading • Valid ROT	Check that heading and ROT are used in VDL message	UTC 13:57 Remark: ***REC:*** The heading input value is cut down to the next lower integer value. In the test an input value of 359.9 is output as 359, not as 0 Retest 2011-11-04 Ba: The heading is correctly rounded	Ok
	Check that alarm relay is inactive		Ok
	Check that no ALR output is active		Ok

a) Disconnect heading and ROT • No heading • No ROT	Check that heading in VDL = default	UTC 13:58	Ok
	Check that ROT in VDL = default		Ok
	Check that ALR message with ID 032 (heading invalid) is output on PI		Ok
	Check that ALR message with ID 035 (ROT invalid) is output on PI		Ok
	Check that alarm relay is active		Ok
	Check that an alarm according to ID 032 is displayed on MKD		Ok
	Check that an alarm according to ID 035 is displayed on MKD		Ok
b) Reconnect heading and ROT • Valid heading • Valid ROT	Check that heading in VDL ok	UTC 13:59	Ok
	Check that ROT in VDL ok		Ok
	Check that ALR message with ID 032 (heading valid) and status V is output on PI		Ok
	Check that ALR message with ID 035 (ROT valid) and status V is output on PI		Ok
	Check that TXT message with ID 031 (Heading valid) is output on PI		Ok
	Check that TXT message with ID 033 (ROT in use) is output on PI		Ok
	Check that alarm relay is inactive		Ok
	Check that the alarm display on MKD is updated		Ok
	Check that the status display on MKD is updated (heading and ROT valid)	TXT 031 and 033 are displayed	Ok
c) Change ROT source • Valid heading • Other ROT source (talker not TI or configuration setting)	Check that ROT in VDL is + 127 for ROT > 10 °/min, turning right	UTC 14:00 720 °/min	Ok
	Check that ROT in VDL is - 127 for ROT < -10 °/min, turning left	-720°/min	Ok
	Check that TXT message with ID 034 (other ROT in use) is output on PI		Ok
	Check that the status display on MKD is updated (other ROT)	TXT 034 is displayed	Ok
d) Change ROT source back to TI • Valid heading • ROT from TI	Check that ROT in VDL ok	UTC 14:02	Ok
	Check that TXT message with ID 033 (ROT in use) is output on PI		Ok
	Check that the status display on MKD is updated (ROT in use)	TXT 033 is displayed	Ok

a) Disconnect ROT • Valid heading • No ROT Change heading	Change heading with 9 °/min Check that ROT in VDL is 0	Retest 2011-11-03 Ba: ROT = 0	Ok
	Change heading with 11 °/min Check that ROT in VDL is + 127 for increasing heading	UTC 14:03 The limit which should be 10°/min seems to be not ok. 14:04: 15°/min: ROT= 0 14:05: 20°/min: ROT changing between 0 and 127 14:06: 25°/min: ROT = 127 Retest 2011-11-03 Ba: ROT = 127	Ok
	Change heading with -9 °/min Check that ROT in VDL is 0	Retest 2011-11-03 Ba: ROT = 0	Ok
	Change heading with -11 °/min Check that ROT in VDL is - 127 for decreasing heading	The limit which should be -10°/min seems to be not ok. 14:07: -20°/min: ROT= 0 14:08 -22°/min: ROT changing between 0 and -127 14:09: -25°/min: ROT = -127 Retest 2011-11-03 Ba: ROT = -127	
	Check that TXT message with ID 034 (other ROT in use) is output on PI		Ok
b) Reconnect ROT • Valid heading • Valid ROT from TI	Check that ROT in VDL ok	14:10	Ok
	Check that TXT message with ID 033 (ROT in use) is output on PI		Ok

2.9.3.3 14.9.5 Speed sensors

(6.10.3.3)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Verify the manufacturer's documentation to ascertain the configuration implemented on the EUT for position sensors (see 6.10).

a) apply valid external DGNSS position and external speed data.

b) disconnect external DGNSS position, disconnect the inputs for SOG, COG or set their data to invalid (e.g. by wrong checksum, "valid/invalid" flag) .

NOTE: Test b) is applicable only if the internal GNSS is used as position source.

Required Result

a) Check that an alarm sentence ALR with alarm ID 027 is sent to the PI and the external data for SOG / COG is sent in VDL msg 1, 2 or 3. Verify that the system continues to operate and that the relay output is not activated.

b) *Check that an alarm sentence ALR with alarm ID 028 is sent to the PI and the internal data for SOG / COG is sent in VDL msg 1, 2 or 3. Verify that the system continues to operate and that the relay output is not activated.*

2011-07-06 Ba	Test details - Speed sensor		
Test item	Check	Remark	Result
Connect external speed sensor input according to test items. Internal GPS is available			
No sensor data: Changing upwards			
a) Start with	Check that SOG = default	UTC 11:14:00	Ok
• No external Position	Check that COG = default		Ok
• No external speed	Check that alarm relay is active		Ok
• No internal Position • No internal speed	Check that the status according to ALR msg ID 029/30 is displayed on MKD		Ok

b) Activate internal GPS • Internal position • Internal speed	Check that SOG from internal GPS is used in VDL message 1,2,3	UTC 11:15:00	Ok
	Check that COG from internal GPS is used in VDL message 1,2,3	= default because speed = 0	Ok
	Check that TXT message with ID 028 (internal speed in use) is output on PI		Ok
	Check that ALR message with ID 29 and 30 (No valid SOG/COG information) with status V is output on PI		Ok
	Check that alarm relay is inactive		Ok
	Check that the status according to TXT 28 is updated on MKD (internal SOG/COG in use		Ok
	Check that the alarm ID 29/30 is deleted from MKD		Ok
c) Connect external speed • No external Position • External speed	Check that SOG from internal Sensor is used in VDL message 1,2,3	UTC 11:16:00	Ok
	Check that COG from internal Sensor is used in VDL message 1,2,3		Ok
d) Connect position (and speed) • External Position • External speed	Check that SOG from external Sensor is used in VDL message 1,2,3	UTC 11:17:00	Ok
	Check that COG from external Sensor is used in VDL message 1,2,3		Ok
	Check that TXT message with ID 027 (external COG/SOG in use) is output on PI		Ok
	Check that the status according to TXT msg ID 027 is displayed on MKD (external COG/SOG in use)		Ok
Changing downwards			
c) Disconnect external position • No external Position • External speed	Check that SOG from internal GPS is used in VDL message 1,2,3	UTC 11:18:00	Ok
	Check that COG from internal GPS is used in VDL message 1,2,3		Ok
	Check that TXT message with ID 028 (internal speed in use) is output on PI		Ok
	Check that the status according to TXT msg ID 028 is displayed on MKD (internal COG/SOG in use)		Ok
b) Disconnect external speed • No external Position • No external speed	Check that SOG from internal GPS is used in VDL message 1,2,3	UTC 11:19:00	Ok

	Check that COG from internal GPS is used in VDL message 1,2,3		Ok
a) Disable internal GPS • No external Position • No external speed • No internal Position • No internal speed	Check that SOG = default	UTC 11:20:00	Ok
	Check that COG = default		Ok
	Check that ALR message with ID 029 (No valid SOG information) is output on PI		Ok
	Check that ALR message with ID 030 (No valid COG information) is output on PI		Ok
	Check that alarm relay is active		Ok
	Check that the status according to ALR msg ID 029/30 is displayed on MKD		Ok

2.10 14.10 Display and control

(6.11)

2.10.1 14.10.1 Data input/output facilities

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

a) Check size of minimum display

b) Record received messages and check contents of minimum display.

c) Input static and voyage related data via the minimum display

Required results

a) The minimum display shall contain at least three lines of data, with no horizontal scrolling of the range and bearing data display..

b) Confirm that all messages including binary and safety related and Long Range messages received can be displayed and that means to select messages and data fields to be displayed are available.

c) Confirm that all necessary data can be input.

At least bearing, range and name of ship shall be displayed without horizontal scrolling

2011-11-21 Ba	Test details - a) MKD size of display		
Test item	Check	Remark	Result
a) Size of display	Check that at minimum 3 lines of data are available	9 lines	Ok
	Check that range and bearing of AIS targets can be displayed without horizontal scrolling	Including age of last received message in minutes	Ok

2011-11-21 Ba	Test details – Display of own ship position		
Test item	Check	Remark	Result
Internal Position	Check that the own ship position is displayed continuously		Ok
	Describe how it is displayed (in which menu/screen) and how this screen is activated	The own position is always displayed in a top status line, together with other relevant information like SOG, COG, UTC and some symbols for Nav status, alarm and Tx/Rx. Remark: SOG and COG are not displayed when not moving	Ok
	Check that the actual source is indicated (external/internal)	The external/ internal information is provided in the AIS configuration/ Indicators menue	Ok
External Position	Check that the own ship position is displayed continuously		Ok
	Check that the actual source is indicated (external/internal)		Ok

2.10.1.1 Display of received messages

2011-11-21 Ba	Test details - b) MKD display of received messages		
Test item	Check	Remark	Result
Receive messages and check display of data			
MSG 1,2,3 Display of dynamic ship data - required -	Check that received target is displayed		Ok
	MMSI	Recommended	Ok
	MMSI of SART: Check that a message 1 with an MMSI 970xxyyyy and navigational status 14 is displayed as an AIS SART, not as a normal target. The Symbol for a graphical display is defined in the display standard IEC 62288	The SART symbol according to IEC 62288 is used with red color. In the target list the target is displayed with red color and the name “AIS SART active”	Ok
	Position (RNG, BRG); Detailed check of values in next table		Ok
	Position (Lat,Lon)	Recommended	Ok
	Time	Not required The age of last received message is displayed in minutes	Ok
	PA (Position accuracy) flag	Not required Not displayed	Ok
	SOG and COG	Recommended	Ok
	True heading	Recommended	Ok
	Navigational status	Recommended	Ok
	Navigational status	Recommended	Ok
Target time-out Check of time-out until a target is deleted from target list.	Ship at anchor and speed < 2 kn	The target time-out of all targets is 7 minutes	Ok
	Ship underway and speed > 2 kn	The target time-out of all targets is 7 minutes	Ok
MSG 5 Display of static and voyage related ship data - required -	MMSI	recommended	Ok
	IMO number	Not required Not displayed	Ok
	Call sign	Recommended	Ok
	Name of ship	Required	Ok
	Type of ship and cargo Check that the new categories according to Clar. 2.2 (X, Y, Z, OS) are displayed	Recommended	Ok
	Dimension/Reference for position	Length recommended Length is displayed	Ok

	Type of EPFD, external position	Not required Not displayed	Ok
	Type of EPFD, internal position Check that the value 15 is correctly displayed	Not required Not displayed	N/A
	Estimated time of arrival	Not required	Ok
	Maximum present static draught	Not required Not displayed	Ok
	Destination	Not required	Ok
	DTE flag	Not require Not displayed	Ok
MSG 4 Base station report - Recommended -	MMSI	Recommended BS-<MMSI> is displayed	Ok
	Position (Lat,Lon)	recommended	Ok
	Position (RNG, BRG); Check values	recommended	Ok
	Time	Not required Age is displayed	Ok
	PA flag	Not required Not displayed	Ok
	RAIM flag	Not required Not displayed	Ok
MSG 9 SAR aircraft position report - optional -	MMSI	Recommended SAR-<MMSI> is displayed	Ok
	Position (RNG, BRG); Check values	Recommended	Ok
	Position (Lat,Lon)	Recommended	Ok
	Time	Not required Age in minutes is displayed	Ok
	PA flag	Not required Not displayed	Ok
	SOG and COG	Recommended SOG is displayed interpreting the value of message 9 as 1/10 kn. It has to interpreted as kn, different to all other messages Retest 2012-02-02 Ba: The speed is displayed in kn	Ok
	Altitude	The altitude is displayed as “N/A” but it is available in the received message 9 Retest 2012-02-02 Ba: The altitude is displayed correctly	Ok

	RAIM flag	Not required Not displayed	Ok
	DTE flag	Not required Not displayed	Ok
MSG 12/14 Safety related text message - Required -	MMSI	Required	Ok
	Text content	Required	Ok
	Broadcast or selective	Recommended The channel is also displayed	Ok
MSG 18,19 Class B position report - required -	MMSI	Required	Ok
	Position (RNG, BRG); Check values	required	Ok
	Position (Lat,Lon)	recommended	Ok
	Time	Not required Age of last received message is displayed in minutes	Ok
	PA flag	Not required Not displayed	Ok
	SOG and COG	Recommended	Ok
	True heading	Recommended	Ok
	RAIM flag	Not required Not displayed	Ok
	Name	Recommended,	Ok
	Type of ship and cargo	Recommended	Ok
	Dimension/Reference for position	Length recommended Length displayed	Ok
	Type of EPFD	Not required Not displayed	Ok
	DTE flag	Not required Not displayed	Ok
MSG 24 Class B position report - required -	MMSI	Required	Ok
	Name	Recommended,	Ok
	Type of ship and cargo	Recommended	Ok
	Call sign	Recommended	Ok
	Dimension/Reference for position	Length recommended Length is displayed	Ok

MSG 21 Aids to navigation report - recommended -	MMSI	Recommended	Ok
	Type of Aids to navigation	Recommended There is a field for the type of AtoN but it is set to N/A Retest 2012-02-02 Ba: The type of AtoN is displayed correctly	Ok
	Name of Aids to navigation	Recommended Only the Name field is displayed but not the Name extension Retest 2012-02-02 Ba: The name extension is displayed in a separate line	Ok
	Position (RNG, BRG);	Recommended	Ok
	Position (Lat,Lon)	Recommended	Ok
	PA flag	Not required Not displayed	Ok
	RAIM flag	Not required Not displayed	Ok
	Virtual/Pseudo AtoN flag	Recommended Not displayed Retest 2012-02-02 Ba: The virtual/ pseudo AtoN flag is displayed. Remark: the RI is not evaluated to display a synthetic AtoN	Ok
	Dimension/Reference for position	Not required Not displayed	Ok
	Type of EPFD	Not required Not displayed	Ok
	Off position indicator	Recommended Not displayed Retest 2012-02-02 Ba: The Off positon indicator is not displayed Retests 2012-02-08 Ba: The Off positon indicator is not displayed	Rec
	SOG, COG are not displayed or show default values	Not displayed	Ok
Means to select messages	Check that means to select received messages are available		Ok
Means to select data fields	Check that means to select data fields are available	If appropriate there are 2 screens with target data which can be selected	Ok

2.10.1.2 Range and Bearing calculation

2011-11-21 Ba	Test details – Range and bearing values -- **Test 1: NE quadrant**		
Test item	Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data			
Own ship position on standard position in NE quadrant (Lat = 53°30 N Lon = 10°E			
Target in NE direction	Check range = 34.9 NM	34,85 NM	Ok
54°00 N 010°30 E	Check bearing = 30.6 °	30.4°	Ok
Target in N direction	Check range = 30 NM	30 NM	Ok
54°00 N 010°00 E	Check bearing = 0°	0 °	Ok
Target in NW direction	Check range = 34.9 NM	34,85 NM	Ok
54°00 N 009°30 E	Check bearing = 329.4°	329,6°	Ok
Target in W direction	Check range = 17.8 NM	17,84 NM	Ok
53°30 N 009°30 E	Check bearing = 270°	270,2°	Ok
Target in SW direction	Check range = 35 NM	34,96 NM	Ok
53°00 N 009°30 E	Check bearing = 210.9°	111,1°	Ok
Target in S direction	Check range = 30 NM	30 NM	Ok
53°00 N 010°00 E	Check bearing = 180°	180°	Ok
Target in SE direction	Check range = 35 NM	34,96 NM	Ok
53°00 N 010°30 E	Check bearing = 149,1°	148,9°	Ok
Target in E direction	Check range = 17.8 NM	17,84 NM	Ok
53°30 N 010°30 E	Check bearing 0 90°	89,8°	Ok

2011-11-21 Ba	Test details – Range and bearing values - **Test 2: Lat=0°, Lon=180°**		
Test item	Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data			
Own ship position on standard position in NE quadrant (Lat = 00°00 N Lon = 179°59.9999 E/W)			
Target in NE direction	Check range = 42,4 NM	42,43 NM	Ok
00°30 N 179°30 W	Check bearing = 45 °	45°	Ok
Target in N direction	Check range = 30 NM	30,0 NM	Ok
00°30 N 179°59.9999 W	Check bearing = 0°	0°	Ok
Target in NW direction	Check range = 42.4 NM	42,43 NM	Ok
00°30 N 179°30 E	Check bearing = 315°	315°	Ok
Target in W direction	Check range = 30 NM	30 NM	Ok
00°00 N 179°30 E	Check bearing = 270°	270°	Ok
Target in SW direction	Check range = 42.4 NM	42,43 NM	Ok
00°30 S 179°30 E	Check bearing = 225°	225°	Ok
Target in S direction	Check range = 30 NM	30 NM	Ok
00°30 S 179°59.9999 E	Check bearing = 180°	180°	Ok
Target in SE direction	Check range = 42.4 NM	42,43 NM	Ok
00°30 S 179°30 W	Check bearing = 135°	135°	Ok
Target in E direction	Check range = 30 NM	30 NM	Ok
00°00 S 179°30 W	Check bearing 90°	90°	Ok

2011-11-21 Ba	Test details – Range and bearing values - **Test 3: SW quadrant**		
Test item	Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data			
Own ship position on standard position in NE quadrant (Lat = 30°30S Lon = 012°00 W)			
Target in NE direction	Check range = 39.6 NM	39,64 NM	Ok
30°00 S 11°30 W	Check bearing = 40.8°	40,9°	Ok
Target in N direction	Check range = 30 NM	30 NM	Ok
30°00 S 12°00 W	Check bearing = 0°	0°	Ok
Target in NW direction	Check range = 39.6 NM	39,64 NM	Ok
30°00 S 12°30 W	Check bearing = 319.2°	319,1°	Ok
Target in W direction	Check range = 25.8 NM	25,85 NM	Ok
30°30 S 12°30 W	Check bearing = 270°	269,9°	Ok
Target in SW direction	Check range = 39.6 NM	39,56 NM	Ok
31°00 S 12°30 W	Check bearing = 220.7°	220,5°	Ok
Target in S direction	Check range = 30 NM	30 NM	Ok
31°00 S 12°00 W	Check bearing = 180°	180°	Ok
Target in SE direction	Check range = 39.6 NM	39,56 NM	Ok
31°00 S 11°30 W	Check bearing = 139.3°	139,5°	Ok
Target in E direction	Check range = 25.8 NM	25,85 NM	Ok
30°30 S 11°30 W	Check bearing 90°	90,1°	Ok

2.10.1.3 CPA/ TCPA alarm

Remark: This test can be deleted if a CPA/ TCPA alarming is not implemented

2011-11-21 Ba	Test details – CPA and TCPA check		
Test item	Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data			
Set positions and speed according to IMO test 1 Set CPA limit = 0,5 and TCPA limit = 25			
Set positions to 3 min before	Check no CPA/TCPA alarm or indication		Ok
Set positions to defined values according to IMO	Check CPA = 0 NM +/- 0.5 NM		Ok
	Check TCPA = 24 min +/- 1 min		Ok
	Check that there is a CPA/TCPA alarm or indication	The target is colored red	Ok
Set position to 3 min after	Check that CPA/TCPA alarm or indication is still active		Ok
Set position again to 3 min before	Check no CPA/TCPA alarm or indication		Ok
Set positions and speed according to IMO test 2 Set CPA limit = 1.1 and TCPA limit = 1			
Set positions to 3 min before	Check no CPA/TCPA alarm or indication		Ok
Set positions to defined values according to IMO	Check CPA = 1 NM +/- 0.5 NM	1 NM	Ok
	Check TCPA = 0 min +/- 1 min	0:0:03	Ok
	Check that there is a CPA/TCPA alarm or indication		Ok
Set position to 3 min after	Check no CPA/TCPA alarm or indication	The indication is still active CPA = 1 NM, TCPA = - 2:54h Perhaps negative TCPA values are not considered correctly Retest 2012-02-03 Ba: There is no CPA/TCPA alarm or indication	Ok
Set positions and speed according to IMO test 3 Set CPA limit = 0,7 and TCPA limit = 25			
Set positions to 3 min before	Check no CPA/TCPA alarm or indication		Ok
Set positions to defined values according to IMO	Check CPA = 0 NM +/- 0.7 NM	CPA = 0.1 NM	Ok
	Check TCPA = 24 min +/- 1 min	TCPA = 25	Ok
	Check that there is a CPA/TCPA alarm or indication	There is no CPA/TCPA indication With TCPA 26 there is an alarm	Ok
Set position to 3 min after	Check that CPA/TCPA alarm or indication is still active	CPA = 0.1 NM, TCPA = 21 min	Ok
Set position again to 3 min before	Check no CPA/TCPA alarm or indication		Ok

Set positions and speed according to IMO test 4 Set CPA limit = 0,7 and TCPA limit = 25			
Set positions to 3 min before	Check no CPA/TCPA alarm or indication		Ok
Set positions to defined values according to IMO	Check CPA = 0 NM +/- 0.7 NM	0.2 NM	Ok
	Check TCPA = 24 min +/- 1 min	24 min	Ok
	Check that there is a CPA/TCPA alarm or indication		Ok
Set position to 3 min after	Check that CPA/TCPA alarm or indication is still active		Ok
Set position again to 3 min before	Check no CPA/TCPA alarm or indication		Ok

2.10.1.4 Input of data

2011-11-21 Ba	Test details d) – Input of data		
Test item	Check	Remark	Result
MMSI number	Check that number can be input		Ok
IMO number	Check that number can be input		Ok
Call sign	Check that Call sign can be input		Ok
Name of ship	Check that name can be input		Ok
Navigational status	Check that data can be input		Ok
	Check if input by number or by selection of items	By selection of items	Ok
	Check that 14 for AIS SART can not be selected	Only values 0-8 can be selected	Ok
Type of ship and cargo	Check that data can be input		Ok
	Check if input by number or by selection of items	By selection of items	Ok
	If input by selection of items: Check that the new values of Clarifications 2.2 (X, Y, Z, OS) can be input		Ok
Dimension/Reference for position	Check that data for internal GPS antenna position can be input	The dimension/ref data for internal GPS can be input but they are always stored as 0,0,0,0 Retest 2012-02-02 Ba: The data are stored correctly.	Nok
	Check that data for external EPFSD position can be input		Ok
Maximum static draught	Check that data can be input		Ok
Destination	Check that name of destination can be input	The destination can be input. The character "*" cannot be input Retest 2012-02-02 Ba: The character "*" can be input	Ok
	Check that estimated time of arrival can be input		Ok

2.10.2 14.10.2 Initiate message transmission

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of non scheduled messages and interrogations as provided by the EUT.

Required results

Confirm that at least the transmission of safety related addressed and broadcast messages (msg 12 and msg 14) can be initiated by means of the minimum display. Confirm that transmission of messages 4, 16, 17, 18, 19, 20, 21, 22 is not possible.

NOTE: Use of messages 4, 16, 17, 18,19, 20, 21, 22 is restricted to base stations or class B AIS.

2011-11-21 Ba	Test details) – Message transmission		
Test item	Check	Remark	Result
Transmission of safety related broadcast message	Check selection between broadcast and addressed message		Ok
	Check selection of TX channel		Ok
	Check data input		Ok
	Check if prepared text blocks are available	Not available	Ok
	Check if input of invalid characters (e.g. lower case letters) are inhibited	Cannot be input	Ok
	Check display of transmission status (indication that message is transmitted)	A green circle is shown	Ok
Transmission of addressed safety related message	Check selection of TX channel		Ok
	Check data input		Ok
	Check input of MMSI		Ok
	Check if selection of MMSI from received message (e.g. position report) is possible		Ok
	Check display of transmission status (indication that message is transmitted and acknowledged)	A yello circle is shown if not successful, otherwise it is green when acknowledged	Ok
Repetition	Check if repetition of transmission is possible without entering the data again.		Ok
Transmission of other messages	Check for a sample of msg 4, 16, 17, 18, 19, 20, 21, 22 that a transmission is not possible.	Transmission of other messages is not possible	Ok

2.10.3 14.10.3 System control

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Perform system control / configuration commands as specified. Check indication of system status / alarms.

Required results

At least initiation of channel switching shall be possible with the minimum display. Output power may not be switched manually. Confirm that the configuration level and other functions, not intended for use by the operator, are protected by password or adequate means.

2.10.3.1 Regional area setting

2011-11-21 Ba	Test details - Regional area entry		
Test item	Check	Remark	Result
Presentation of the existing areas	Check that the 8 existing areas can be selected and displayed		Ok
	Check display of Channel A and B		Ok
	Check display of RX/TX mode		Ok
	Check display transmission power		Ok
	Check display of NE point of area		Ok
	Check display of SW point of area		Ok
	Check display of transitional zone		Ok
Entry of a new area	Check selection between changing an existing area and creating a new regional area entry	There is a menu item “Add region” for a new region and “view regions” for change of existing regions	Ok
	Check input of Channel A and B		Ok
	Check input of RX/TX mode		Ok
	Check input transmission power		Ok
	Check input of NE point of area		Ok
	Check input of SW point of area		Ok
	Check input of transitional zone		Ok
	Check that the user has to confirm a second time that the new data shall be stored		Ok
Enter invalid channel	Check that entry is refused		Ok
Enter too small area (<20 NM)	Check that entry is refused		Ok
Enter too large area (> 200 NM)	Check that entry is refused		Ok
Enter a region according to M.1371-1 A2/4.1 figure 4.1.5A (4 adjacent areas)	Check that entry is refused		Ok

Changing an existing area	Check that existing area for changes can be selected		Ok
	Check change of Channel A and B		Ok
	Check change of RX/TX mode		Ok
	Check change transmission power		Ok
	Check change of NE point of area		Ok
	Check change of SW point of area		Ok
	Check change of transitional zone		Ok
	Check that the user has to confirm a second time that the new data shall be stored		Ok
Changing of default values	Check that the default Channels (AIS1 and AIS2) cannot be changed without entering a complete area		Ok
	Check that the TX /Rx mode cannot be changed without entering a complete area		Ok
	Check that the transmission power cannot be changed without entering a complete area		Ok
Erase of area settings	Check that areas cannot be deleted manually except when replaced by another overlapping area setting. (It may be acceptable if this can be done in the password protected system configuration part)		Ok

2.10.3.2 Password protection

Remark to password protection:
If only 1 password is used, no data which may be change during normal operation should be protected by this password.

If two password levels are used (installation, administrator or level 1 password and operation, user or level 2 password), data which may be changed during normal operation should be protected by the level 2 password, not by level 1 password.

	Test details - Password protection			
Input item	Level 1 Requirement	Level 2 Recommendation	Implemented type of protection	Result
Static data				
MMSI	Required	---	Protected with Admin password	Ok
IMO-Number	Required	---	Protected with Admin password	Ok
Call sign	Recommended	Recommended, if not level 1	Protected with Admin password	Ok
Name	Recommended	Recommended, if not level 1	Protected with Admin password	Ok
Dimension/Reference for position	Required	---	Protected with Admin password	Ok
Type of ship	Recommended		Protected with Admin password	Ok
Tx off switching	Required, if function available	---	Silent mode is protected with Admin password	Ok
Voyage data				
Navigational status	Not allowed	Not recommended	Not protected	Ok
Type of cargo	Not allowed	Not recommended	Not protected	Ok
Destination	Not allowed	Not recommended	Not protected	Ok
ETA	Not allowed	Not recommended	Not protected	Ok
Maximum static draught	Not allowed	Not recommended	Not protected	Ok
Persons on board	Not allowed	Not recommended	Not protected	Ok
Other operational data				

Area settings	Not allowed	Recommended	Protected with Admin password. Area settings are operational settings. They should not be protected with the admin password but could be protected with the operator password Retest 2012-02-02 Ba: Area settings are protected with the User/Operator password	Ok
Message transmission	Not allowed	Recommended	Protected with operator password	Ok
Long range confirmation	Not allowed	Not recommended	Not protected	Ok
Configuration data				
Serial port settings (Baudrate, ...)	Required	---	Protected with Admin password	Ok
Long range autoackn.	Not required	Recommended	Protected with Admin password	Ok

2.10.3.3 Alarm and status display

2011-11-21 Ba	Test details - Alarms display			
ID	Test item	Check	Remark	Result
001	Tx malfunction	Check is done in 2.9.2.1		Ok
002	Antenna VSWR exceeds limit	Check is done in 2.9.2.2		Ok
003	Rx channel 1 malfunction	Check documentation	Documentation required	Ok
004	Rx channel 2 malfunction	Check documentation		Ok
005	Rx channel 70 malfunction	Check documentation		Ok
006	General AIS failure	Check documentation		Ok
008	MKD connection lost	Check is done in 2.9.2.5		Ok
025	External EPFS lost	Check is done in 2.9.3.1		Ok
029	No valid SOG information	Check is done in 2.9.3.3		Ok
030	No valid COG information	Check is done in 2.9.3.3		Ok
032	Heading lost/invalid	Check is done in 2.9.3.2		Ok

035	No valid ROT information	Check is done in 2.9.3.2		Ok

2011-11-21 Ba		Test details - Status display		
ID	Test item	Check	Remark	Result
007	UTC clock lost		Remark: UTC clock lost is handled as an alarm, according to edition 2 of IEC 61993-2	Ok
021	External DGNSS in use	Check is done in 2.9.3.1		Ok
022	External GNSS in use	Check is done in 2.9.3.1		Ok
023	Internal DGNSS in use (beacon)	Check is done in 2.9.3.1		Ok
024	Internal DGNSS in use (msg 17)	Check is done in 2.9.3.1		Ok
025	internal GNSS in use	Check is done in 2.9.3.1		Ok
027	External SOG/COG in use	Check is done in 2.9.3.3		Ok
028	Internal SOG/COG in use	Check is done in 2.9.3.3		Ok
031	Heading valid	Check is done in 2.9.3.2		Ok
033	Rate of Turn indicator in use	Check is done in 2.9.3.2		Ok
034	Other ROT source in use	Check is done in 2.9.3.2		Ok
036	Channel management parameters changed	Check that status change is displayed if channel manage-ment parameters are changed.		Ok
	TXT request See note)	Check that the actual TXT sentences can be requested using the $xxAIQ,TXT sentence		Ok

Note) This function is not explicitly required in the IEC 61993 standard, but an external display unit cannot handle the status display correctly without being able to request the actual standard. Therefore we require this function.

2.10.3.4 Ergonomic aspects

This are some ergonomic aspects from user view (Recommendation).

Topic	Description

3 15 Physical tests

Physical test are not part of this test document.

Physical tests are done in a separate test.

4 16 Specific tests of Link Layer

(7.3)

4.1 16.1 TDMA Synchronisation

(M.1371 A1/3.1.1)

4.1.1 16.1.1 Synchronisation test using UTC

(M.1371 A1/3.1.3.4.1)

Method of measurement

Set up standard test environment; chose test conditions in a way that the EUT operates in following synchronisation modes:

- *UTC direct*
- *UTC indirect (internal GNSS receiver disabled; at least one other station UTC direct synchronised)*
- *BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range)*

Check CommState Parameter SyncState in position Report and reporting rate

Required result

Transmitted Communication state shall fit the Synchronisation mode

2011-06-16 Ba	Test details - TDMA Synchronisation		
Test item	Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn			
• Operate with GPS	Check that sync state is 0 (UTD direct)		Ok
	Check that report rate is 10 s		Ok
• Disable GPS by disconnection of GPS antenna, • at least one other AIS transponder with UTC direct	Check that sync state is 1 (UTC indirect	UTC 12:30	Ok
	Check that report rate is 10 s		Ok
• GPS disabled • Remove other AIS	Check that sync state is 3 (no UTC source)		Ok
• GPS disabled, • One base station with UTC direct within range	Check that sync state is 1 (UTC indirect)	UTC 12:34	Ok
	Check that report rate is 10 s		Ok
• GPS disabled • Remove Base station	Check that sync state is 3 (no UTC source)		Ok

4.1.2 16.1.2 Synchronisation test without UTC, semaphore

(M.1371 A1/3.1.1.4)

Method of measurement

Set up standard test environment without UTC available. Let EUT operate as a sync source (semaphore) for other stations. Check CommState Parameter SyncState in position Report and reporting rate.

Required results

Transmitted CommState shall fit the Synchronisation mode.

The EUT shall increase reporting rate to 2 s when acting as a semaphore.

2011-MM-DD	**Tester:**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate EUT without GPS, other transponders all without GPS, SOG = 10 kn a) different number of received stations				
EUT has highest number of received stations		Check that sync state is 3	UTC 13:22	Ok
		Check that report rate is 2 s		Ok
Apply another station with higher number of received stations than EUT		Check that sync state is 3		Ok
		Check that report rate changes to 10 s after 3 min		Ok
b) Same number of received stations				
EUT has lowest MMSI		Check that sync state is 3	UTC 13:40	Ok
		Check that report rate is 2 s		Ok
Apply another station whith lower MMSI than EUT		Check that sync state is 3		Ok
		Check that report rate changes to 10 s after 3 min	UTC 14:26	Ok

NOTE[1)] An AIS transponder becomes semaphore, if it has the highest number of received stations. If there are more than one station with the highest number of received stations the transponder with the lowest MMSI number becomes semaphore.

4.1.3 16.1.3 Synchronisation test without UTC

(M.1371 A1/3.1.1)

Method of measurement

Set up standard test environment; chose test conditions in a way that EUT operates in following sync modes:

a) BASE indirect (internal GNSS disabled; no station with UTC direct synchronisation or Base station within range,)

b) Mobile indirect (internal GNSS disabled; other station with UTC direct synchronisation or Base station without range,)

c) Enable internal GNSS in synchronisation modes other than UTC direct

Check CommState Parameter SyncState in position Report and reporting rate.

Required results

a) Transmitted Communication state shall fit the Synchronisation mod

b) Transmitted Communication state shall fit the Synchronisation mod

d) Synchronisation mode shall revert to UTC direct

2011-06-16 Ba	Test details - TDMA Synchronisation		
Test item	Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn			
• Disable GPS, • One base station without GPS within range	Check that sync state is 2 (Base station indirect)		Ok
	Check that report rate is 10 s		Ok
• GPS disabled • Remove Base station	Check that sync state is 3 (no UTC source)		Ok
• Operate without GPS • Other Transponders all without GPS, • Not semaphore 1)	Check that sync state is 3		Ok
	Check that report rate is 10 s	UTC 13:27	Ok
• Enable GPS • Other Transponders all without GPS,	Check that sync state is 0		Ok
	Check that report rate is 10 s	UTC 13:50	Ok

4.2 16.2 Time division (Frame format)

(M.1371 A1/3.1.2)

Method of measurement

Set the EUT to max reporting rate of 2 sec by applying a speed of >23kn and a ROT of >20°/sec. Record VDL messages and check for used slots. Check parameter slot number in CommState of position report. Check slot length (transmission time)

Required results

Slot number used and slot number indicated in CommState shall match. Slot number shall not exceed 2249. Slot length shall not exceed 26,67msec.

2011-06-08 Ba	Test details - TDMA Synchronisation		
Test item	Check	Remark	Result
Check the data recorded in 2.4.1 "14.4.1 Speed and course change" according to the test items. Check the frames with 2 s reporting rate			
Slot number	Check that slot number used and slot number indicated in CommState match		Ok
Slot count	Check that Slot number does not exceed 2249		Ok
Slot length	Check that Slot length does not exceed 26,67 ms		Ok

4.3 16.3 Synchronisation jitter

(M.1371 A1/3.2.2.8.4)

Definition

Synchronisation jitter (transmission timing error) is the time between nominal slot start as determined by the UTC synchronisation source and the initiation of the "transmitter on" function (T_o see figure 3.2.2.10 in Rec. ITU-R M.1371-1).

Method of measurement

Set-up standard test environment. Set the EUT to 25 kHz bandwidth, max reporting rate of 2 sec and using

a) UTC direct synchronisation

b) UTC indirect synchronisation by disconnecting the GNSS antenna of the EUT.

Record VDL messages and measure the time between the nominal beginning of the slot interval and the initiation of the "transmitter on" function. Alternative methods, e.g. by evaluating the start flag and calculating back to T_o are allowed.

Repeat the test for 12.5 kHz bandwidth.

Required results

The synchronisation jitter shall not exceed

a) ±104 µs using UTC direct synchronisation

b) ±312 µs using UTC indirect synchronisation .

2011-06-14 Ba	Test details - Synchronisation jitter		
Test item	Check	Remark	Result
Operate device at 25 kHz bandwidth at a reporting rate of 2 s (speed = 25 kn). C heck the slot start time T2 using the VDL analyser.			
UTC direct	Check that T2 is in the range of 3.328 ms +/- 0.108 ms The measured value of the VDL analyser (in units of 10 µs) should be in the range of 330 ... 360 (RMS, inc. Tolerance of VDL analyser)	The timing is about 60 µs too late but it is within the limits.	Ok
UTC indirect	Check that T2 is in the range of +/- 0.312 ms compared to the T2 value of the sync source The measured value of the VDL analyser (in units of 10 µs) should be in the range of +/- 31 of the measured values of the sync source	The timing is even within the limits of UTC direct.	Ok

4.4 16.4 Data encoding (bit stuffing)

Method of measurement

Setup standard test environment.

- *apply a binary broadcast message (msg 8) to the VDL containing the HEX-values "7E 3B 3C 3E 7E" in the data portion and check Presentation Interface output of EUT*
- *apply a BBM message to the EUT initiating the transmission of msg 8 containing the HEX-values as above in the data portion and check the VDL*

Required results

Confirm that

- *Data output on the presentation interface conforms to transmitted data*
- *transmitted VDL message conforms to data input on the Presentation Interface*

The data sequence 7E 3B 3C 3E 7E is appended to an application identifier of 16 bit with the value 00 68 h (DAC = 001, FI=40). So the complete sequence is:

Data in Hex	7E 3B 3C 3E 7E
Data in 6 bit ASCII text (Table 14 of 1371)	_#,<O'
Hex including DAC/FI	00 68 7E 3B 3C 3E 7E
Coded in 6 bit ASCII (Table B-1)	06Qv>khvOP,4
Content of VDO/VDM (incl. 40 bit header)	80003sh0J7ps?3qv,0

2011-06-16 Ba	Test details - Data encoding (bit stuffing)		
Test item	Check	Remark	Result
File name for BBM sentence is AIBBM_bin_stuffing.sst			
RX of BBM message Transmit msg 8 from VDL generator	Check that VDM is according transmitted data		Ok
TX of BBM message Apply BBM sentence to the PI	Check that VDO output of PI is according to BBM sentence		Ok
	Check with VDL analyser that VDL message is according to BBM		Ok
	Check that VDM sentence of RX is according to VDO of TX		Ok

4.5 16.5 Frame check sequence

(M.1371 A1/3.2.3)

Method of measurement

Apply a simulated position report message with wrong CRC bit sequence to the VDL.

Required results

Confirm that this message is not forwarded to the PI by the EUT.

2011-06-16 Ba	Test details - Frame check sequence		
Test item	Check	Remark	Result
Transmit position report message from VDL generator			
Set CRC bit sequence to ok	Check that position report is received from EUT (VDO output)		Ok
Set CRC bit sequence to false	Check that position report is not received from EUT (VDO output)	UTC 13:55	Ok

4.6 16.6 Slot allocation (Channel access protocols)

(M.1371 A1/3.3.1)

4.6.1 16.6.1 Network entry

Method of measurement

Set up standard test environment; switch on EUT. Record transmitted scheduled position reports for the first 3 frames after initialisation period. Check CommState for channel access mode

Required results

EUT shall start autonomous transmissions of msg 3 (position report) with ITDMA CommState with KeepFlag set true for first frame and msg 1 with SOTDMA CommState for consecutive frames.

2011-06-08 Ba	Test details – Channel access protocol		
Test item	Check	Remark	Result
Switch on EUT and record data with VDL analyser. Note the switch on time in UTC			
Transmission time	Check that first transmission of position report is within 2 min after switch on	After about 1min40	Ok
First message	Check that the first message of the network entry is a message 3	The first message is a message 5 See note) Retest 2011-07-13 Ba: Message 5 is transmitted in the second frame in ITDMA mode	Ok
Initial message type	Check that the network entry is done with msg 3		
Keep flag	Check that the keep flag is set in msg 3		Ok
Slot offsets	Check that the slot offsets of msg 3 are in the range 750 +/- 75= 675 ... 825		Ok
Slot use	Check that the allocated slots are used in the next frame		Ok
Message type	Check that the message type is changed to 1 after initial frame		Ok
Timeout	Check that the time-out in the 2nd frame is between 2 and 6 (decremented from initial 3..7)		Ok

Note)
ITU-R M.1371 defines in A2 3.3.5.2:
The first transmission of a Class A mobile station should always be the special position report (Message 3, see Fig. 12).

The main reason is that the first messages should be used to allocate the slots for further transmissions. This allocation cannot be done by a message 5.

Therefore I recommend to send the first message 5 in the second frame. So the slots for message 5 can be allocated by one of the position reports.

2011-06-09 Ba	Test details – Channel access at increased reporting rate		
Test item	Check	Remark	Result
Supply external speed data of 15 kn Switch on EUT and record data with VDL analyser.			
Initial reporting rate	Check that the EUT performs network entry with a reporting rate of 6s		Ok
Slot offsets	Check that the slot offsets of msg 3 are in the range 450 +/- 45 = 405....495		Ok
Supply external speed data of 25 kn Switch on EUT and record data with VDL analyser.			
Initial reporting rate	Check that the EUT performs network entry with a reporting rate of 2 s		Ok
Slot offsets	Check that the slot offsets of msg 3 are in the range 150 +/- 15 = 135...165		Ok

4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)

(M.1371 A1/3.3.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Record transmitted scheduled position reports msg 1 and check frame structure. Check CommState of transmitted messages for channel access mode and parameters slot timeout, slot number and slot offset

Required results

Check that nominal reporting rate is achieved ±20% (allocating slots in selection interval SI). Confirm that the EUT allocates new slots NTS within SI after 3 to 8min. Check that slot offset indicated in CommState matches slots used for transmission.

2011-06-08Ba	Test details – Autonomous scheduled transmissions (SOTDMA)		
Test item	Check	Remark	Result
Record the VDL data of 8 frames operating with autonomously scheduled transmissions. Generate a table and diagram from that data and check the following test items using the recorded data. Set the condition so that the reporting rate is 10 s.			
Reporting rate	Check that the reporting rate is 10 s, 6 msg per frame		Ok
Nominal increment and selection interval	Check that the allocated slots match the nominal and selection interval of 10 s reporting rate	Test 2011-06-09 Ba:	Ok
Slot interval	Check that the slot intervals are in the range 375 +/- 75 = 300 ... 450	Test 2011-06-09 Ba:	Ok

Timeout	Check that the time-out is counting from 3...7 to 0		Ok
Slots used	Check that the slots indicated in CommState match the slots used		Ok
Slots allocated at time-out 0	Check that the slots are used in the next frame		Ok
	Check the slot offset is 2250 +/- Selection Interval (2175...2325)		Ok
CommState sub message	Check that for time-out 3,5,7 the number of received stations is indicated		Ok
	Check that for time-out 2,4,6 the slot number is indicated		Ok
	Check that for time-out 1 the correct value of UTC is indicated		Ok
	Check that for time-out 0 the slot increment is indicated		Ok
Alternating channels	Check that the position reports are transmitted on alternating channels		Ok
Msg 5	Check that the channel alternating of position report is not impaired by msg 5		Ok
Others	Check the recorded data for other possibly incorrect items		Ok

4.6.3 16.6.2 add Autonomous scheduled transmissions (ITDMA)

(M.1371 A1/3.3.2)

(from Inland AIS)

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Set NavStatus of EUT to "at anchor" giving a reporting interval of 3 min. Record transmitted scheduled position reports.

Required results

Check that EUT transmits message 3 and allocates slots using ITDMA and that slot offset indicated in CommState matches slots used for transmission.

Check that nominal reporting interval is achieved ±20 %.

2011-06-09	Test details – Autonomous scheduled transmissions (ITDMA)		
Test item	Check	Remark	Result
Record the VDL data of 8 frames operating with autonomously scheduled transmissions. Generate a table and diagram from that data and check the following test items using the recorded data. Set the condition so that the reporting rate is 3 min			
Reporting rate	Check that the reporting rate is 3 min		Ok
Message type	Check that msg 3 is used		Ok
Slot interval	Check that the slot intervals are 3 min +/- 20 %	The interval of 3 min +/- 20 % is exceeded. See Note) Retest 2011-07-14 Ba: The reporting interval is not exceeded.	Ok
Slot increment	Check that the slot increment = 13500 +/- 10 %	The slot increment is generally within the limits. But the slot increment of the message at UTC 09:32:00 is outside the limits. The value is incorrect. The message is about 3 minutes later then the allocated slot. This problem should be checked. Retest 2011-07-14 Ba: The slot increments are within the limits	Ok
Number of slots	Check that the number of slots = 1 (value in comm state = 5)		Ok
Keep flag	Check that the keep flag = 0		Ok
Alternating channels	Check that the position reports are transmitted on alternating channels		Ok

Note)
In my understanding the selection interval is 20% of 3 minutes = 36 s, ranging from NS –18s to NS +18s.

That means that the distance from message to message is in the range of 3 min +/- 20 %.

I have made diagrams with
- **the Tx time modulo 3 min with a SI of 36 s (+/-18s)**
- **the time from message to message with the limits at 180s +/- 36 s**

4.6.4 16.6.3 Single message transmission (RATDMA)

(M.1371 A1/3.3.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

a) Apply a 1 slot Binary Broadcast message (msg 8) to the PI of the EUT. Record transmitted messages.

b) Apply combinations of Binary Broadcast message (msg 8), Addressed Binary message(msg 14), Broadcast Safety Related message (msg 6) and Addressed Safety Related message(msg12) to the PI of the EUT. Record transmitted messages and output of the PI of the EUT.

Required results

a) Confirm that EUT transmits this msg 8 within max. 4sec. Retry with 90% channel load.

b) Confirm that maximum 20 slots can be used per frame for unannounced messages using RATDMA access scheme and that messages using the twenty first slot and above are rejected. Confirm that message ABK is sent with acknowledge type 2 (Message could not be broadcast) when the message is rejected.

2011-06-16 Ba	Test details – a) ITDMA transmission		
Test item	Check	Remark	Result
Apply an binary broadcast message 8 to the PI port of the EUT < 4 s before next scheduled transmission. File name is: AIBBM_bin.sst			
Standard test environment	Check that msg 8 is transmitted within 4 s	UTC 13:59	Ok
	Check that **RATDMA** is used if there is no position report within **4 s**		Ok
	Check that **ITDMA** is use, if there is a position report in the next **4 s** The position report is changed from msg 1 to 3 to announce the msg 8 slot		Ok
90 % channel load	Check that msg 8 is transmitted within 4 s		Ok
	Check that **RATDMA** is used if there is no position report within **4 s**		Ok
	Check that **ITDMA** is use, if there is a position report in the next **4 s** The position report is changed from msg 1 to 3 to announce the msg 8 slot		Ok

2011-07-06 Ba	Test details – b) Multi RATDMA transmissions		
Test item	Check	Remark	Result
Apply more than 20 msg 6,8,12,14 to the PI port of the EUT within one frame. File name is: AIBBM_25.sst. Delay = 2 s			
Maximum transmissions per frame	Check that only 20 msg are transmitted in one frame. Msg 21 ... have to be rejected		Ok
ABK output	Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.		Ok

4.6.4.1 16.6.3 add 1 Transmission of message 5 (ITDMA)

(M.1371/A2-3.3.2, 3.3.4.2.1, 3.3.4.1)

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Record transmitted messages.

Required results

Confirm that EUT transmits message 5 using the ITDMA access scheme. The ITDMA access scheme shall replace a scheduled position report message 1 with a message 3.

2011-06-09 Ba	Test details – ITDMA transmission of msg 5		
Test item	Check	Remark	Result
Record the VDL data of 15 frames operating with autonomously scheduled transmissions.. Set the condition so that the reporting rate is 10 s.			
Reporting rate	Check that the reporting rate of msg 5 is 6 min		Ok
Message type for allocation	Check that a message 1 before msg 5 on the same channel is changed to msg 3 to allocate the slots for message 5	Only if there is a message 1 in the last 4 s before message 5 the slots of message 5 are allocated by message 3 Because the transmission of message 5 is known 6 min before the transmission slot it is no problem to use a position report which is more than 4 s before the Tx time of message 5 for slot allocation. Retest 2011-07-14 Ba: Message 5 is allocated in all cases. If time-out of message 1 is 0 it is extended to the next frame	Ok
Number of slots	Check that the number of slots = 2		Ok
Keep flag	Check that the keep flag = 1		Ok
Slot allocation	Check that the slot allocated by msg 3 is used for Tx of msg 5		Ok
Alternating channels	Check that the msg 5 are transmitted on alternating channels		Ok

4.6.5 16.6.4 Assigned operation

(M.1371 A2/3.3.6)

A fast and simple test of assigned operation has been made in paragraph 2.1.2 14.1.2 Assigned mode).

A record of the complete operation from assignment message until end of switch back to SOTDMA should be made and evaluated.

4.6.5.1 16.6.4.1 Assigned mode using reporting rates

Method of measurement

Operate standard test environment and EUT in autonomous mode. Transmit an Assigned mode command msg 16 to the EUT with:

a) the number or reports per 10 min which is not a multiple of 20

b) the number or reports per 10 min which is higher than 600

Required results

a) Confirm that EUT transmits position reports message msg 2 at a report rate that corresponds to the next highest multiple of 20

b) Confirm that EUT transmits position reports message msg 2 at a report rate of one report per second.

2011-06-20 Ba	Test details – Assigned Mode		
Test item	Check	Remark	Result
Send a msg 16 rate assignment with invalid offset values			
Offset value = 110 (not a multiple of 20)	Check that the reporting rate is 120/10min = 12/min = 5s	UTC 11:10	Ok
Offset value = 1000 (> 600 msg/10 min	Check that the reporting rate is 600/10min = 60/min = 1s	UTC 11:19	Ok
Send a msg 16 rate assignment with EUT as second transponder in the message			
Dest. A: rate = 600 msg/10min Dest. B: rate = 120 msg/10min	Check that the EUT does reschedule to the assigned reporting rate of 120 msg/10 min = 12 msg/min = 5s	UTC 12:33	Ok

4.6.5.2 16.6.4.2 Receiving test

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command (msg 16) to the EUT with:

- *slot offset and increment*
- *designated reporting rate.*

Record transmitted messages.

Required results

Confirm that EUT transmits position report msg 2 according to defined parameters and reverts to SOTDMA msg 1 with standard reporting rate after 4 to 8 min (ITU-R M.1371 A2/3.3.8.2.12).

General problems			
Date	Item	Remark	Result
2011-06-20	Message 16 depending on message s4	It seems that message 16 is accepted only if there is also a message 4 from the same base station. It have not found a requirement for this in the ITU or IEC standard. There is also no technical reason for this because message 16 is addressed to the individual station. So there is no unintended Rx by distant stations. Retest 2011-07-13 Ba: Message 16 (rate and slot assignment) is accepted also without message 4	Ok

2011-06-17 Ba	Test details a)– Slot offset and increment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset A = offset to first assigned slot = 40 and slot increment parameter = 4 (increment = 125) Within the time-out time repeat the message 16 Record VDL messages and evaluate record			
VDM output	Check VDM output of msg 16		Ok
First message	Check that first message is sent after 40 slots		Ok
Message type	Check that message type of position report is 2		Ok
Initialisation phase	Check that EUT starts immediately (after offset slots) with message 2		Ok
Deallocation of previously used slots	Check that the slot used before assignment are deallocated using timeout value = 0 and slot offset = 0		Ok
Alternating channels	Check that position report is sent alternating on channel A and B		Ok
Increment	Check that the increment is 125 slots		Ok
Timeout	Check that all slots of the first msg2 frame have the same timeout		Ok
	Check that the timeout is between 3 and 7	Time-out = 7	Ok
	Check that the timeout is decremented after 1 min	When a new message 16 is received the time-out is re-set to a new random value	Ok
Comstate	Check that the ComState is like the ComState of msg 1		Ok
Switch back to autonomous mode	Check that the EUT deallocates all msg 2 slots with timeout 0		Ok
	Check that the EUT changes slots with timeout 0 on each channel to ITDMA slot msg 3 to start autonomous mode		Ok
	Check that EUT initialises autonomous mode like network entry	In the next frame	Ok

2011-06-17 Ba	Test details b)– Rate assignment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset=reporting rate of 300msg/10 min, increment=0 Within the timeout time repeat the message 16 Record VDL messages and evaluate record			
VDM output	Check VDM output of msg 16		Ok
Initialisation phase	Check that EUT starts immediately with rescheduling to the new reporting rate	With the next scheduled position report on each channel	Ok
Message type	Check that message type of position report is 2 instead of msg 1		Ok
Reporting rate	Check that the reporting is 300 msg/10 min = 30msg/frame = 2 s		Ok
Alternating channels	Check that position report is sent alternating on channel A and B		Ok
Initialisation	Check that the Initialisation is according to changing reporting rate using msg 3 to allocate new slots		Ok
Timeout	Check that the assigned timeout is between 2 and 6		Ok
Assignment repetition	Check that the timeout is extended by repetition of msg 16: Switch back is between 3 and 7 minutes after last repetition		Ok
Switch back to autonomous mode	Check that the EUT reverts to normal reporting rate between 4 and 8 minutes after last msg 16	5 min after last message 16	Ok

4.6.5.3 16.6.4.3 Assignment selectivity

(M.1371 A1/3.3.6)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Check frame structure. Transmit an Assigned mode command (msg 16) to another AIS with a slot offset and increment pointing to a slot used by the EUT. Record transmitted messages.

Required results

Confirm that EUT does not allocate slots on a msg16 addressed to other stations.

2011-06-20 Ba	Test details)– assignment selectivity		
Test item	Check	Remark	Result
Send a message to another MMSI			
VDM output	Check that there is no VDM output of msg 16		Ok
Wrong MMSI	Check that the EUT does not change the reporting rate		Ok

4.6.5.4 16.6.4.4 Slot assignment to FATDMA reserved slots

(M.1371 A1/3.3.6)

A test to check the combined operation of msg 16 assignment to slots reserved by msg 20.

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment. Transmit an Assigned Mode Command (msg 16) to the EUT and command it to use one or more of those FATDMA allocated slots. Record transmitted messages.

Required results

Confirm that EUT uses the slots commanded by msg 16 for own transmissions.

2011-07-06 Ba	Test details – Slot assignment to FATDMA reserved slots		
Test item	Check	Remark	Result
Send a message 20 from VDL Generator with slot offset and increment for slot reservation: Offset = 23, slots = 5, time-out = 7, incr. = 25 Send a message 16 from VDL Generator assigning one or more of these reserved slots Offset = 25, incr. = 5 (= 75 slots)			
Rx of msg 20	Check that msg 20 has been received by EUT (VDM output)	UTC 14:08/9	Ok
Slot use	Check that slots assigned by the msg 16 are used by the EUT	UTC 14:10	Ok

4.6.6 16.6.5 Fixed allocated transmissions (FATDMA)

(M.1371 A1/3.3.6)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment. Record transmitted messages.

Required results

Confirm that EUT does not use slots allocated by msg 20 for own transmissions until timeout of 4 to 8 min.

2011-06-17 Ba	Test details – FATDMA reserved slots		
Test item	Check	Remark	Result
Send base station report message 4 with distance < 120 NM Send a message 20 from VDL Generator with slot offset and increment for slot reservation according to the description below. To get enough new slot allocations within time-out time set reporting rate to 2 s (speed > 25 kn)			
Record VDL messages	Check that the reserved slots are not used by the EUT within a time-out of 4-8 minutes	The time-out is not forced to 0, so it can take up to 7 minutes until the reserved slots are released. We recommend to force the time-out to 0 to release the reserved slots within 1 minute	Ok
End of reservation	Check that after end of reservation all slots are used again.		Ok
Other channel	Check that the reserved slots are also not used on the other channel because of priority rules See note 2)		Ok
Repeat test without message 4	Check that all slots are used	Test 2011-07-06 Ba: There is no VDM output of message 20. See Note 1) Retest 2011-11-03 Ba: All slots are used There is a VDM output of message 20	Ok
Repeat test with base station, distance > 120 NM	Check that all slots are used	Test 2011-07-06 Ba: There is no VDM output of message 20 See Note 1) Retest 2011-11-03 Ba: All slots are used There is a VDM output of message 20	Ok

Note 1)
It seems that there is no VDM output if the rules for slot reservation by message 20 do not apply (message 4 with distance < 120 NM available). The rules for slot reservation (distance < 120 NM) are related to the slot reservation, not to the VDM output. Message 20 should be output always when it has been received (see table 20, message 20, column “O”).

If there is not VDM output of message 20 the test cannot be reliable performed. It cannot be verified that the message 20 has been really received.

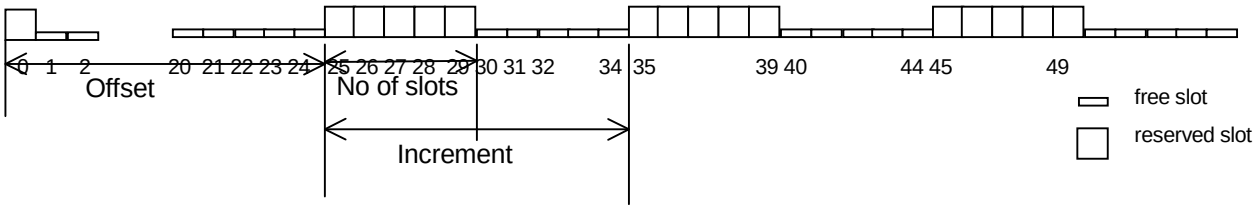
Note 2)
According to ITU-R M1371, §4.4.1 and clarification 2.56 a slot reserved by a base station on the other channel has got the lowest possible priority, that means it can be used for candidate slots, but only if no other slot with higher priority is available.

In the actual test scenario there are normally at minimum 5 free slots (free on both channels – highest priority) available. Therefore there is no reason to use one of the low priority slots for candidates.

Test scenario: Msg 20 transmission by test system.
Msg 20 reserves slots which should not be used by mobile stations.
Msg 20 parameters:

- Msg 20 is transmitted in slot 0 in each frame
- Offset number 1: 25
- Number of slots: 5
- Time out 1: 3
- Increment: 10

FATDMA reservation



4.6.7 16.6.7 Group assignment

Remark: This section is not part of IEC 61993-2 Ed.1. Because group assignmet is required by ITU-R M.1371-4 this section is completely copied from the IEC 61993-2 Ed. 2 CDV including the numbering.

4.6.7.1 16.6.7.1 Assignment priority

Method of measurement

Set up standard test environment and operate EUT in autonomous mode, and use a base station MMSI to transmit Messages 22 and 23. Transmit an assigned mode command (Message 23) to the EUT with T_x/R_x mode 1 as follows.

a) Transmit a Message 22 defining a region with the EUT inside that region. Transmit a Message 22 to the EUT individually addressed and specifying T_x/R_x mode 2.

b) Transmit a Message 23 to the EUT with T_x/R_x mode 1 within 10 min of test a).

c) Repeat transmission of Message 23 to the EUT with T_x/R_x mode 1 after 15 min of test a).

d) Repeat the test, clear the region defined by Message 22 under a), and transmit Message 22 to the EUT with regional settings specifying T_x/R_x mode 2.

NOTE This can be carried out using the method used in 17.8.1.1 b) step 2 or by assigning a new simulated position to the EUT.

Record transmitted messages.

Required results

Verify that:

a) the T_x/R_x mode field setting of Message 22 takes precedence over the T_x/R_x mode field setting of Message 23;

b) the EUT ignores the assignment by Message 23 and the setting of Message 22 takes precedence for 10 min;

c) the EUT applies the T_x/R_x mode setting of Message 23;

d) the T_x/R_x mode field setting of Message 23 takes precedence over the T_x/R_x mode field setting of Message 22. The receiving station shall revert to its previous T_x/R_x mode after a timeout value randomly chosen between 240 s and 480 s.

2011-06-17	**Tester: Ba**	**Test details:** Assignment priority		
Test item		Check	Remark	Result
The test sequence is modified to improve testability (Test d) before a)..c)). Set up EUT in autonomous mode.				
Transmit Message 23 with Tx/Rx mode = 1		Verify that Message 23 is received and content is correct.		Ok
Reporting rate		Check that reporting rate is as expected by Message 23.		Ok
T_x/R_x mode		Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).		Ok

Message 22 to an area			
d) Transmit Message 22 (T_x/R_x mode = 0)	Verify that Message 22 is received (ACA output).		Ok
T_x/R_x mode	Check T_x/R_x mode = 1 (T_x on channel A) according to Message23		Ok
Wait for time-out of Message 23			
Reporting rate	Check that reporting rate = autonomous reporting rate.		Ok
T_x/R_x mode	Check T_x/R_x mode = mode of Message 22 = 0 (T_x on channel A and B).		Ok
Message 22 individually addressed			
Transmit Message 23 (T_x/R_x mode = 1)	Verify that Message 23 is received and content is correct.		Ok
T_x/R_x mode	Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).		Ok
a) Transmit Message 22 individually addressed (MMSI) (T_x/R_x mode = 2)	Verify that Message 22 is received and content is correct.		Ok
T_x/R_x mode	Check T_x/R_x mode = mode of Message 22 = 2 (T_x on channel B)		Ok
b) Transmit Message 23 with T_x/R_x mode 1 within 10 min after Message 22	Verify that Message 23 is received and content is correct.		Ok
T_x/R_x mode	Confirm that EUT transmit position reports on the channel specified in Message 22 (T_x on channel B).		Ok
c) Transmit Message 23 with T_x/R_x mode 1 at 15 min min after Message 22	Verify that Message 23 is received and content is correct.	11 min after message 23	Ok
T_x/R_x mode	Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).		Ok

4.6.7.2 16.6.7.2 Increased reporting interval assignment

Method of measurement

Set up the standard test environment and operate EUT in autonomous mode with 10 s reporting interval, and use a base station MMSI to transmit Message 23 as follows.

a) Transmit a group assignment message (Message 23) to the EUT with a reporting interval that is longer than the autonomous reporting interval.

b) Transmit a group assignment message (Message 23) to the EUT with a quiet time command.

c) Set the Nav status to "moored" and "at anchor" and SOG < 3 kn. Transmit a group assignment message (Message 23) to the EUT with a reporting interval that is shorter than the autonomous reporting interval.

d) Set the Nav status to "moored" and "at anchor" and SOG > 3 kn. Transmit a group assignment message (Message 23) to the EUT with a reporting interval that is shorter than the autonomous reporting interval.

Record transmitted messages.

Required results

Confirm that:

a) the EUT ignores the assignment command and transmits position reports with the autonomous reporting interval;

b) the EUT ignores the assignment command and transmits position reports with the autonomous reporting interval;

c) the EUT ignores the assignment command and transmits position reports with the autonomous reporting interval;

d) the EUT transmits position reports with the assigned reporting interval (6 s).

2011-07-07	**Tester: Ba**	**Test details:** Increased reporting interval		
Test item		Check	Remark	Result
SOG = 10 kn, reporting interval = 10 s				
Reporting rate		Check VDO output and verify that the reporting interval is as given by autonomous mode (10 s)		Ok
a) Transmit Message 23 (reporting interval > 10 s)		Verify that EUT receives the msg 23		Ok
Report rate		Check that transponder declines Message 23 command: Reporting interval = 10 s		Ok
b) Transmit Message 23 with quiet time		Verify that EUT receives the Message 23		Ok
Report rate		Check that transponder declines Message 23 command, EUT continues transmission with 10 s reporting interval		Ok
Nav status = moored or at anchor, SOG < 3 kn, reporting interval = 3 min				
Reporting rate		Check that the reporting interval = 3 min		Ok
c) Transmit Message 23 (reporting interval < 3 min)		Verify that EUT receives the msg 23	UTC 13:22	Ok
		Check that transponder declines Message 23 command: Reporting interval = 3 min		Ok

Nav status = moored or at anchor, SOG > 3 kn, reporting interval = 3 min			
	• After setting speed to 10 kn the EUT starts transmission with an interval of 20 s on channel A only. • The transmissions on channel B start with the next scheduled message 3, 4 min after increasing the speed. This is not correct, the new reporting interval of 10 s has to start immediately, as it is done under normal condition in Tx/Rx mode 0. • After start of the transmission schedule on channel B the time of the SI is not correct. It is nearly at the same time as the SI on channel A, not with an offset of 10 s as required. See diagram! <u>Retest 2011-11-03 Ba:</u> The transition from 3 min to 3 s interval is correct		Ok
Reporting rate	Check that the reporting interval 10 s		Ok
d) set SOG > 3 kn	Verify that EUT receives the msg 23		Ok
Transmit Message 23 (reporting interval 5s)	Check reporting interval = 5s		Ok

4.6.7.3 16.6.7.3 Entering interval assignment

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 s Use a base station MMSI to transmit Message 23.

a) Transmit a group assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned.

b) Repeat test with a reporting interval of 2 s assigned.

c) Transmit a group assignment command (Message 23) to the EUT with a reporting interval field setting 10 (next longer autonomous reporting interval).

d) Operate EUT in autonomous mode with a reporting interval of 6 s. Transmit a group assignment command (Message 23) to the EUT with a reporting interval field setting 9 (next shorter autonomous reporting interval).

Monitor the VDL.

Required results

Verify that:

a) EUT enters assigned operation mode and transmits position report Message 2 with 5 s reporting interval. EUT builds up the assigned transmission scheduled according to network entry procedure; verify that unused slots of the previous reporting schedule are released;

b) EUT enters assigned operation mode and transmits position report Message 2 with 2 s reporting interval;

c) EUT does not enter~~s~~ assigned operation mode and transmits position report Message ~~2~~1 with ~~5~~10 s reporting interval;

d) EUT enters assigned operation mode and transmits position report Message 2 with ~~5~~2 s reporting interval.

2011-06-17	**Tester: Ba**	**Test details:** Entering interval assignment		
Test item		Check	Remark	Result
a) Operate the EUT with a autonomous reporting interval of 10 s. Send a group assignment message 23 with a reporting interval of 5 s (value 8). Record VDL messages and evaluate record.				
VDM output		Check VDM output of Message 23		Ok
Initialisation phase		Check that EUT starts immediately with rescheduling to the new reporting rate	With the next scheduled position report on each channel	Ok
Message type		Check that message type of position report is 2 instead of Message 1		Ok
Reporting rate		Check that the reporting interval = 5 s		Ok
Alternating channels		Check that position report is sent alternating on channel A and B		Ok
Slot deallocation		Check that the slot of the assigned reporting interval are released using time-out = 0 and slot offset = 0		Ok
Initialisation/ Slot allocation		Check that the slot of the autonomous reporting interval (10 s) are allocated according to the network entry procedure		Ok
Timeout		Check that the assigned timeout is between 2 and 6	• The message 2 in slot 718 has a time-out of 3. In the next frame this is not counted down to 2 but re-set to 7. • The time-out of the message in slot 1481 is 1. It should be in the range of 3 to 7. Additionioally it is not counted down to 0 in the next frame but re-set to 7 <u>Retest 2011-07-14 Ba:</u> The assigned time-out is correct.	Ok
b) Send a group assignment message 23 with a reporting interval of 2 s (value 11).				
VDM output		Check VDM output of Message 23	UTC 11:49	Ok
Message type		Check that message type of position report is 2		Ok
Reporting rate		Check that the reporting interval = 2 s		Ok

c) Send a group assignment message 23 with reporting interval = next longer interval (value 10).			
VDM output	Check VDM output of Message 23		Ok
Message type	Check that message type of position report is 1		Ok
Reporting rate	Check that the reporting interval = 10 s		Ok
d) Operate the EUT with a autonomous reporting interval of 6 s. Send a group assignment message 23 with reporting interval = next shorter interval (value 9).			
VDM output	Check VDM output of Message 23	UTC 12:06	Ok
Message type	Check that message type of position report is 2		Ok
Reporting rate	Check that the reporting interval = 2 s		Ok

4.6.7.4 16.6.7.4 Assignment by region

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 s and use a base station MMSI to transmit Message 23 as follows.

a) Transmit a group assignment command (Message 23) to the EUT (define station type 0 and geographic region so that the EUT is inside this region). Set the reporting rate to 2 s and apply message to VDL.

b) Transmit a group assignment command (Message 23) to the EUT (define station type 0 and geographic region so that the EUT is outside this region). Set the reporting rate to 2 s and apply message to VDL.

Required result

Verify that:

a) EUT switches to assigned mode and transmits position reports with 2 s intervals. Verify that EUT reverts to normal operation mode after timeout period.

a) EUT declines Message 23.

2011-07-07	**Tester: Ba**	**Test details:** Assignment by region		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that the reporting interval is 10 seconds (SOG = 10 kn).				
a) Transmit Message 23, EUT inside region (Reporting interval value = 11 = 2s)		Check that Message 23 is received (VDM output)	UTC 11:49	Ok
		Check that the reporting interval is changed to 2 s		Ok
		Verify that EUT reverts to normal operation mode after 4... 8 min		Ok

EUT outside the addressed region			
Transmit Message 23, EUT outside region (Reporting interval = 2 s)	Verify that EUT declines Message 23 Reporting interval = 10 s	UTC 12:20	Ok
Message 23 from a non-base station MMSI			
Transmit Message 23, EUT inside region (Reporting interval = 2 s) MMSI is a non-base station MMSI	Verify that EUT declines Message 23 Reporting interval = 10 s	- There is no VDM. - The assignment is ignored. We recommend to output a VDM to indicate that the message 23 has been received.	Ok

4.6.7.5 16.6.7.5 Assignment by station type

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 s and use a base station MMSI to transmit Message 23 as follows.

a) Transmit a group assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 s and the station type to 0 (all stations).

b) Transmit a group assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 s and the station type to 4 (A to N).

c) Transmit a group assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 5 s and the station type to 1 (Class A Mobile). Apply this message to the VDL again within 4 min.

Record VDL and check reaction of the EUT.

Required results

Verify that:

a) EUT switches to assigned mode and transmits position reports with 2 s reporting interval. Verify that EUT reverts to autonomous mode after timeout period;

b) EUT declines Message 23;

c) EUT switches to assigned mode and transmits position reports with 5 s reporting interval. Verify that EUT reverts to autonomous operation mode after timeout period of second transmitted group assignment.

2011-07-07	**Tester: Ba**	**Test details:**		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that reporting interval is 10 s (SOG).				
a) Transmit Message 23 EUT inside area, station type = 0, Reporting interval = 2 s		Check that Message 23 is received (VDM output)		Ok
Reporting rate		Check that the reporting interval is changed to 2 s		Ok
Message 23 timeout		Verify that EUT reverts to normal operation mode after 4... 8 min		Ok
b) Transmitt Message 23 with station types not valid for EUT, Reporting interval = 2 s				
station type = 2 (all types of Class B mobile stations),		Check that Message 23 has been received (VDM output)	UTC 13:13	Ok
		Check reporting interval = 10 s		Ok
station type = 3 (SAR airborne mobile station),		Check that Message 23 has been received (VDM output)		Ok
		Check reporting interval = 10 s		Ok
station type = 4 (Class B SO mobile stations only),		Check that Message 23 has been received (VDM output)		Ok
		Check reporting interval = 10 s		Ok
station type = 5 (Class B CS mobile stations only),		Check that Message 23 has been received (VDM output)		Ok
		Check reporting interval = 10 s		Ok
station type = 6 (Inland Waterways),		Check that Message 23 has been received (VDM output)		Ok
		Check reporting interval = 10 s		Ok
c) Transmitt Message 23 with station types valid for EUT, Reporting interval = 2 s				
station type = 1 (Class A mobile stations only),		Check that Message 23 has been received (VDM output)	UTC 12:23 5 min time-out	Ok
		Check reporting interval = 2 s		Ok
Apply message 23 again within 4 min		Check that Message 23 has been received (VDM output)		Ok
		Verify that EUT reverts to normal operation mode at 4... 8 min after the last Message 23		Ok

4.6.7.6 16.6.7.6 Addressing by ship and cargo type

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 s and use a base station MMSI to transmit Message 23 as follows.

a) Transmit a group assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 s and the ship and cargo value to a desired value. Make sure that this value is also configured in the EUT.

b) Transmit a group assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 s and the ship and cargo value to a desired value. Make sure that a different value is configured in the EUT.

Required results

Verify that:

a) EUT switches to assigned mode and transmits position reports with 2 s reporting interval. Verify that EUT reverts to autonomous mode after timeout period;

b) EUT declines Message 23.

2011-07-07	**Tester: Ba**	**Test details:** a) Matching type of ship		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG). Set EUT to ship and cargo type = 72.				
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 72		Check that Message 23 is received (VDM output)	UTC 12:38	Ok
		Check that the reporting interval is changed to 2 s		Ok
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 70		Check that Message 23 is received (VDM output)	UTC 12:31	Ok
		Check that the reporting interval is changed to 2 s		Ok

2011-07-07	**Tester: Ba**	**Test details:** b) Type of ship not matching		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG). Set EUT to ship and cargo type = 82.				
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 72		Check that Message 23 has been received (VDM output)	UTC 12:30	Ok
Reporting rate		Check that EUT transmit position reports with autonomous reporting interval..		Ok

4.6.7.7 16.6.7.7 Reverting from interval assignment

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI, transmit a group assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned. Monitor the VDL until at least 1 min after timeout occurred. Repeat 10 times (transmissions of Message 23 shall not be synchronised to the initial transmission schedule of the EUT).

Measure the time T_{rev} between the reception of Message 23 and first transmission after timeout.

Required results

Verify that the EUT enters autonomous mode after a timeout of 4 min to 8 min and transmits position report Message 1 and releases unused slots from previous schedule.

2011-06-17	**Tester: Ba**	**Test details:** Reverting from interval assignment		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG).				
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 5 s		Check that Message 23 has been received. Record R_x time		Ok
Reporting rate		Check that EUT transmit position reports with reporting interval of 5 s.		Ok
Time-out		Check that the EUT reverts to 10 s reporting rate after 4.. 8 min	8 min after last msg 23	Ok
Slot deallocation		Check that the slot of the assigned reporting interval are released using time-out = 0 and slot offset = 0		Ok
Slot allocation		Check that the slot of the autonomous reporting interval (10 s) are allocated according to the network entry procedure		Ok

4.7 16.7 Message Formats

(M.1371 A1/3.3.7)

4.7.1 16.7.1 Received messages

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Apply messages according to Table 7 to the VDL. Record messages output by the PI of EUT.

Required results

Confirm that EUT outputs corresponding message with correct field contents and format via the PI or responds as appropriate.

Even if most received messages are already tested in special sections a complete receiving test over all messages is provided here.

2011-07-08 Ba	Test details – Content of msg 1,2,3 Position report		
Test item	Check	Remark	Result
Transmit a message 1,2 or 3 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message content	Check the the message content is correct.		Ok

2011-07-08 Ba	Test details – Content of msg 4 Base station report		
Test item	Check	Remark	Result
Transmit a msg 4 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message content	Check the the message content is correct.		Ok

2011-07-08 Ba	Test details – Content of msg 5 Static data		
Test item	Check	Remark	Result
Transmit a message 5 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 2		Ok
Check sentence number	Check that value = 1,2		Ok
Sequential message ident.	Check that counting from 0...9 modulo 10		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2		Ok
Message content	Check the the message content is correct.		Ok

2011-07-08 Ba	Test details – Content of msg 6 Addressed binary message		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2 (msg length = 112 bit)		Ok
Message content	Check the the message content is correct.		Ok
Transmit a message 6 addressed to other AIS. Message shall not be output on PI.			
Msg6 to other AIS	Check PI , no VDM		Ok