Bundesrepublik Deutschland
Federal Republic of Germany

Bundesamt für Seeschifffahrt und Hydrographie

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Conformance test report of an

AIS system

Equipment under test: **SAM**

Type: **AIS 3410**

Applying test standards: IEC 61993-2 (2001) Sections 14, 16-21

Test Report No.: BSH/4612/4320732/10/S3140

Applicant: SAM Electronics GmbH

Behringstr. 120
22763 Hamburg
Deutschland

Hamburg, 18 March 2010
Federal Maritime and
Hydrographic Agency

by order

Bartels
Test engineer

by order

Preuss
Head of
laboratory

nach EN ISO/IEC 17025:2005
akkreditiertes Prüflaboratorium

Deutscher Akkreditierungs Rat
DAR
DAT-P-086/98

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See notes overleaf

General

Applicant:	SAM Electronics GmbH Behringstr. 120, 22763 Hamburg, Deutschland
Equipment under test:	
Type:	AIS 3410
Manufacturer:	SAM Electronics GmbH
	Behringstr. 120, 22763 Hamburg, Deutschland
Place of test:	BSH test laboratory Hamburg, Room 916
Start of test:	16 April 2008
End of test:	16 March 2010

Test standards[1]:

Recommendation ITU-R M.1371-3
Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band.
IALA technical clarifications
of Recommendation ITU-R M.1371-3, Ed. 2.2

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 testing and required test results

IEC 61162-1/ -2
Maritime navigation and radiocommunication equipment and systems Digital Interfaces
Part 1: single talker and multiple listeners (2000)
Part 2: single talker and multiple listeners, high speed transmission (1998)

[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.

Summary

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

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1 General

1.1 Equipment history

For each Transponder unit under test an numbered entry is provided here. For the two test environment it is recorded which EUT system is under test in that environment

1.1.1 EUT system no 1

Transponder				
Type	UAIS SAM 3410	Part No.:		
Delivery date	2008-04-15	Serial number	Prototype without S/N	
HW Version:	Delivery date	2008-04-15	Version no	----
	Installation date	2008-04-15		
SW Version:	Delivery date	2008-04-15	Version no	Version 1.0 Build 5, 1.1.2008
	Installation date	2008-04-15		
SW Version:	Delivery date	2008-05-26	Version no	Version 1.0 Build 6, 25.5.2008
	Installation date	2008-05-26		
SW Version:	Delivery date	2008-09-25	Version no	Version 1.0 Build 8, 22.9.2008
	Installation date	2008-09-25		
SW Version:	Delivery date	2009-01-13	Version no	Version 1.0 Build 10, 12.01.2009
	Installation date	2009-01-13		
SW Version:	Delivery date		Version no	
	Installation date			

MKD				
Type	DCU DEBEG 3401	Part No.:	AZ 3067	
Delivery date	2004	Serial number	003B09	
HW Version:	Delivery date		Version no	
	Installation date			
SW Version:	Delivery date	2004	Version no	Version 1.1.4 Build 025 2.6.2004
	Installation date	2004		
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna			
Type	Micropulse	Part No.:	1330 FP
Delivery date	2003	Serial number	

1.1.2 EUT system no 2

Transponder				
Type	UAIS SAM 3410		Part No.:	
Delivery date	2009-03-23		Serial number	---
HW Version:	Delivery date	2009-03-23	Version no	
	Installation date	2009-03-23		
SW Version:	Delivery date	2009-03-23	Version no	1.0 Build 12
	Installation date	2009-03-23		29.03.2009
SW Version:	Delivery date		Version no	
	Installation date			

MKD				
Type	Radarpilot 1100		Part No.:	GE 3062 G 051
Delivery date	2009-03-23		Serial number	225/30886
HW Version:	Delivery date	2009-03-23	Version no	
	Installation date	2009-03-23		
SW Version:	Delivery date	2009-03-23	Version no	5.1.0
	Installation date	2009-03-23		26.03.2009
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna			
Type	Micropulse	Part No.:	1330 FP
Delivery date	2003	Serial number	

1.1.3 EUT system no 3

Transponder				
Type	UAIS SAM 3410	Part No.:		
Delivery date	2009-06-22	Serial number	00019	
HW Version:	Delivery date	2009-06-22	Version no	
	Installation date	2009-06-22		
SW Version:	Delivery date	2009-06-22	Version no	1.0 Build 19
	Installation date	2009-06-22		21.06.2009
SW Version:	Delivery date	2009-07-20	Version no	1.0 Build 21
	Installation date	2009-07-20		18.07.2009
SW Version:	Delivery date	2009-08-27	Version no	1.0 Build 22
	Installation date	2009-08-27		25.08.2009
SW Version:	Delivery date	2009-09-10	Version no	1.0 Build 23
	Installation date	2009-09-10		08.09.2009
SW Version:	Delivery date		Version no	
	Installation date			

MKD				
Type	Radarpilot 1100	Part No.:	GE 3062 G 051	
Delivery date	2009-03-23	Serial number	225/30886 Same as EUT 2	
HW Version:	Delivery date	2009-03-23	Version no	5
	Installation date	2009-03-23		
SW Version:	Delivery date	2009-03-23	Version no	5.1.0
	Installation date	2009-03-23		26.03.2009
SW Version:	Delivery date	2009-06-22	Version no	5.1.0
	Installation date	2009-06-22		10.6.2009
SW Version:	Delivery date	2009-07-13	Version no	5.1.0
	Installation date	2009-07-13		8.7.2009
SW Version:	Delivery date	2009-08-27	Version no	5.1.0
	Installation date	2009-08-27		14.8.2009 Build 5066
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna			
Type	Micropulse	Part No.:	1330 FP
Delivery date	2003	Serial number	

1.2 Test environment

Here it is intended to record for which time which EUT system is under test.

1.2.1 Test environment no 1

This Test environment is completely equipped as described in Annex A. Normally mainly VDL related tests and DSC tests are done in this environment

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	2008-04-16	2008-04-22	Bartels
1	2008-05-26	2008-06-05	Bartels
1	2008-07-08	2008-07-17	Bartels
1	2008-09-25	2008-10-01	Bartels
1	2009-01-13	2009-01-21	Bartels
2	2009-03-23	2009-04-06	Bartels
3	2009-06-22	2009-06-26	Bartels
3	2009-07-22	2009-07-22	Bartels
3	2009-08-27	2009-08-28	Bartels
3	2009-09-10	2009-09-10	Bartels
3	2010-03-04	2010-03-04	Bartels
3	2010-03-16	2010-03-16	Bartels

1.3 Composition

Minimum Keyboard and display (MKD)

☐ Internal ☒ Remote ☐ external

internal GNSS

☐ sync only ☒ backup pos. sensor

1.4 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	Result	Status

Issue of this template: 2007-12-05
2009-01-19: Updated to template: 2007-12-05

[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

1.5 General observations

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

General problems			
Date	Item	Remark	Result
2008-10-01 Ba	Nav status	Der Navigationsstatus wird nicht immer gespeichert, wenn das Gerät ausgeschaltet wird. Ich habe noch nicht genau herausgefunden, unter welchen Bedingungen es nicht gespeichert wird. Retest 2009-06-26 Ba: The problem has not been observed during the current test phase.	Passed
2008-09-29 Ba	3 min reporting rate	After a start of the unit for test 14.4.3 the EUT did not enter 3 min reporting rate. The conditions were: • Nav status = 1 • SOG = 2 kn This are the conditions for 3 min reporting rate but the EUT remained on 10 s reporting rate (20 s per channel). There is a PI log of this test available. In other tests under the same conditions the EUT entered 3 min reporting rate. Retest 2009-06-26 Ba: The problem has not been observed during the current test phase.	Passed
2008-04-03	Startup problems	At two times the unit did no start output of data on the PI port. In the first case all settings data have been lost. Retest 2009-06-26 Ba: The problem has not been observed during the current test phase.	Passed
2008-04-03	PI port output	Several times the EUT changed the PI port output data to some kind of binary data (see screen shots of hyper terminal), in the same output period as the original data (about once per second). The baud rate has been checked by oscilloscope and was ok. This problem can be reproduced by applying RTCM data to the Long range port, but it happend also during normal operation. In case of LR input the output of incorrect data continued after stop of RTCM input. After restart the data were ok again. The output of the other PI port (Pilot port) was not affected by this problem, the data were ok. Retest 2009-06-26 Ba: The problem has not been observed during the current test phase. It can also not be reproduced when RTCM data are applied to the LR port.	Passed

1.6 4.3 Manuals

1.6.1 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.

2010-03-16 Ba	Test details – General documentation		
Test item	Check	Remark	Result
Composition of customer documentation	Check the composition of customer documentation.	The documentation consists of: • Technical manual • Operational manual	
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.		Passed
Operating information	Check that an operating manual is included	ED5051G522	Passed
Technical information	Check that an technical manual is included	ED3047G842	Passed
Installation information	Check that an installation manual is included	Included in the installation manual	Passed
Language	Check that the documentation is written in English		Passed
Some details of installation information			
System overview	Check that an AIS system overview diagram is available		Passed
Mechanical dimensions	Check that mechanical dimension drawings of transponder are available		Passed
	Check that mechanical dimension drawings of MKD are available	In the technical manual of the Radarpilot	Passed
	Check that mechanical dimension drawings of a Connection box available	The connection board is included in the AIS transponder unit	N/a
	Check that mechanical dimension drawings of GPS antenna are available		Passed
	Check that mechanical dimension drawings of VHF antenna are available		Passed

2010-03-16 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	Terminal board	Passed
Siting of antennas	Check that information about siting the GPS antenna is included		Passed
	Check that information about siting the VHF antenna is included		Passed
RF cable requirements	Check that information about cable requirements for GPS antenna is included		Passed
	Check that information about cable requirements for the VHF antenna is included		Passed
Illumination	Check that information about external illumination is included if required	No illumination required	N/A

1.6.2 Interface documentation

(61993-2) The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular (see 7.219.2 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.

2010-03-16 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	The ports are designated with + and – instead of A and B But there is a declaration in 4.3.1.7 which lines (+/-) are A and B	Passed
b) Output driver	Check that the output drive capability is included		Passed
c) Talker sentences of PI ports	Check that list of sentences is included		Passed
	Check that unused fields are noted		Passed
c) Talker sentences of long range port	Check that list of sentences is included		Passed
	Check that unused fields are noted		Passed
d) Input load	Check that the input load is included		Passed
e) Input sentences of PI ports	Check that list of sentences is included		Passed
	Check that required and unused fields are noted		Passed
e) Input sentences of long range port	Check that list of sentences is included		Passed
	Check that required and unused fields are noted		Passed
e) Input sentences of sensor inputs	Check that list of sentences is included		Passed
	Check that a list is included for each sensor input if different for the ports		N/A
	Check that required and unused fields are noted		Passed
Proprietary sentences	Check that proprietary sentences are listed and described		Passed
f) Software version	Check that the relevant software version is included	For all versions	Passed
f) Hardware version	Check that the relevant hardware version is included	DEBEG 3410	Passed
g) Hardware input/output circuit	Check that information about hardware interface components is included		Passed
h) Standards	Check that the version number and date of update of the relevant standard is included		Passed

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.

2008-04-16 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		Passed
Transmission rate	Check that the message 1 is transmitted continuously		Passed
Position	Check the values of lat and lon		Passed
Speed	Check the values of SOG and COG		Passed
Heading/ROT	Check that the values of heading and ROT are default		Passed

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.

2008-04-17 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		Passed
Transmission rate	Check that the message 1 is received continuously		Passed
Position	Check the values of lat and lon		Passed
Speed	Check the values of SOG and COG		Passed
Heading/ROT	Check the values of heading and ROT		Passed

2008-04-17 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		Passed
Transmission rate	Check that the message 1 is received continuously		Passed
Position	Check the values of lat and lon		Passed
Speed	Check the values of SOG and COG		Passed
Heading/ROT	Check the values of heading and ROT		Passed

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.

2008-04-17 Ba	Test details - Interrogation of msg 3		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,00000xxxx,3,,,,,, Change type from 5 to 3 A response is automatically transmitted by the addressed transponder			
VDO output of EUT	Check the VDO output on PI		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
RX of request	Check that message is received by addressed transponder (VDM)		Passed
Received by VDL Analyser	Check request on VDL analyser		Passed
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Passed
RX of response (VDM)	Check that the response message 3 is received by EUT (VDM)		Passed

2008-04-17 Ba	Test details - Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,00000xxxx,5,,,,,, A response is automatically transmitted by the addressed transponder			
VDO output of EUT	Check the VDO output on PI		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
RX of request	Check that message is received by addressed transponder (VDM)		Passed
Received by VDL Analyser	Check request on VDL analyser		Passed
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Passed
RX of response (VDM)	Check that the response message 5 is received by EUT (VDM)		Passed

2008-04-17 Ba	Test details - Interrogation of msg from base stations		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,00000xxxx,4/20/22,,,,,, Change type to 4, 20, 22 The response from the base station is not checked			
Request msg 4	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 9	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 18	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 19	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 24	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 20	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 22	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed

2008-04-17 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,00000xxxx,3,,5,,000007001,5,, A response is automatically transmitted by one of the addressed transponder			
VDO output of EUT	Check the VDO output on PI		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgement	$AIABK,000005002,A,15,,3	Passed
RX of request	Check that message is received by one of the addressed transponders (VDM)		Passed
Received by VDL Analyser	Check request on VDL analyser		Passed
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Passed
RX of response (VDM)	Check that the response message 5 is received by EUT (VDM)		Passed

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.

2008-04-17 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)		Passed
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Passed
Response on VDL	Check the response on VDL with the VDL analyser, note slot offset	Slot offset 57, 19	Passed
Response channel	Check that the response is transmitted on the request channel		Passed

2008-04-17 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)		Passed
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Passed
Response on VDL	Check the response on VDL with the VDL analyser		Passed

Slot selection	Check that the slot offset defined in the request is used	The slot offset is always the slot offset of msg 15 – 1, e.g. if the Tx slot is 1000 and the slot offset is 100 the response is not transmitted in slot 1100 but in slot 1099. Retest 2008-09-25 Ba: The slot offset is correct	Passed

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 "".

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

2008-04-17 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		Passed
Channel	Check Tx channel		Passed
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentence		Passed
RX of request	Check that message is received by addressed transponder (VDM)		Passed
Received by VDL Analyser	Check msg on VDL analyser		Passed
TX of ackn. msg 7 (VDO)	Check that ackn msg 7 is transmitted by addressed transponder (VDO)		Passed
Use of Appl. ID	Check for proper use of DAC and FI for text messages when using MKD		Passed
RX of msg 7 (VDM)	Check that the ackn. msg 7 is received by EUT (VDM)		Passed
AIABK acknowledgement		$AIABK,00000102,A,6,2,0	Passed
Add invalid character to encapsulated data, e.g. x,y,z			
Transmission	Check that message is not transmitted		Passed
ABK sentence	Check that ABK message with ackn. type 2 (could not be broadcast) is output on PI		Passed

2008-04-17 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		Passed
Channel	Check Tx on channel A		Passed
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentence		Passed
Received by VDL Analyser	Check msg on VDL analyser		Passed
RX of msg 13 (VDM)	Check that the ackn. msg 13 is received by EUT (VDM)		Passed
acknowledgement	Check AIABK or MKD for corresponding pos. and neg. ackn.		Passed

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 .

2008-04-17 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		Passed
	Check DAC		Passed
	Check FI		Passed
	Check binary data		Passed
Addressed to other AIS transponder	Check that no VDM output on PI or on display of EUT		Passed

2008-04-17 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		Passed
	Check message text		Passed
Addressed to other AIS transponder	Check that no VDM output on PI or on display of EUT		Passed

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

2008-04-18 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		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,,,8,6,3	Passed
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence	= 6	Passed
Message on VDL	Check the broadcast message on VDL analyser		Passed
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Passed

2008-04-18 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		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,,,14,6,3	Passed
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence	= 6	Passed
Message on VDL	Check the broadcast message on VDL analyser		Passed
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Passed

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.

2008-04-18 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		Passed
Message on VDL	Check that no message is received by VDL analyser		Passed
AIABK acknowledgement	Record the AIABK output, check that type = 2 (could not be broadcast)	$AIABK,,,8,1,2	Passed

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.

2008-04-18 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	No VDO output	Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements, type should be 3	$AIABK,,,8,1,2	Passed
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		N/A
Message on VDL	Check the broadcast message on VDL analyser		N/A
Rx on other transponder (VDM)	Check the VDM output of an other transponder		N/A

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.

2008-04-18 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		Passed
Navigational status	See below		Passed
Position	Check the values of lat and lon and compare with MKD display		Passed
Speed	Check the values of SOG and COG and compare with MKD display		Passed
Heading/ROT	Check that the values of heading and ROT are default		Passed
Position accuracy flag	Check flag with and without differential corrections by msg 17		Passed
Time stamp	Check time stamp		Passed
Comm state	Check for availability, detailed test in 5		Passed
Default values	Check that default values for LAT, LON, SOG, COG are transmitted if internal GNSS is unavailable		Passed

2008-04-18 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		Passed
Status = 1 (at anchor)	Check Status in VDL message 1		Passed
Status = 7 (fishing)	Check Status in VDL message 1		Passed
Status = 15 (undefined)	Check Status in VDL message 1	Remark: Cannot by selected by MKD. Applied by VSD, is displayed by MKD as “not defined”	Passed
Other status values	Check some other values	4, 8, 5	Passed

2.3.2 Information content of msg 5

2008-04-18 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		Passed
AIS version indicator	Check that version is 0		Passed
IMO number	Check value in msg 5		Passed
Call sign	Check value in msg 5		Passed
Name of ship	Check value in msg 5		Passed
Type of ship and cargo type	Check value in msg 5		Passed
Reference point for internal GPS			
Reference point A	Check value in msg 5		Passed
Reference point B	Check value in msg 5		Passed
Reference point C	Check value in msg 5		Passed
Reference point D	Check value in msg 5		Passed
Reference point for EPFS			
Reference point A	Check value in msg 5		Passed
Reference point B	Check value in msg 5		Passed
Reference point C	Check value in msg 5		Passed
Reference point D	Check value in msg 5		Passed
Tx of msg 5	Check if msg 5 is transmitted at change of position source		Passed
Voyage related data			
ETA	Check value in msg 5		Passed
Maximum present static draught	Check value in msg 5		Passed
Destination	Check value in msg 5		Passed
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	SSD input is ignored, the DTE flag is set according to the MKD connection	Passed
DTE off	Check that DTE flag = 1		Passed
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		Passed
Talker = GL	Check type of EPFS = 2		Passed
Talker = GN	Check type of EPFS = 3		Passed
Talker = LC	Check type of EPFS = 4		Passed
Talker = IN	Check type of EPFS = 6		Passed
Talker = other	Check type of EPFS = 0		Passed
Internal GPS	Check type of EPFS = 15	Test 2009-08-27 Ba:	Passed

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.

2008-04-16 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		Passed
Speed = 15 kn	Check slot allocation using msg 3 for new reporting rate		Passed
	Check that slot allocation for the new reporting rate has started after 2 transmissions	Slot allocation starts with the next transmission	Passed
	Check that new rate is established within 1 minute		Passed
	Check that new reporting rate is 6 s	10 Tx per minute	Passed
Speed = 25 kn	Check slot allocation using msg 3 for new reporting rate		Passed
	Check that slot allocation for the new reporting rate has started after 2 transmissions		Passed
	Check that new rate is established within 1 minute		Passed
	Check that new reporting rate is 2 s	30 Tx per minute	Passed
Reduction of speed to Speed = 15 kn	Check slot allocation by deallocation of slots, Msg 3 not required for new reporting rate	Remark: The messages which are kept for the new reporting interval are changed to type 3 and allocate the next msg 3 on the same channel. This is not necessary because the slots have already been allocated. They are continuing the message 1 of the previous frame. Nevertheless it is acceptable.	Passed
	Check that new rate starts after 3 min and is established within 4 minutes		Passed
	Check that new reporting rate is 6 s		Passed
Reduction of speed to Speed = 10 kn	Check slot allocation using msg 3 for new reporting rate		Passed
	Check that new rate starts after 3 min and is established within 4 minutes		Passed
	Check that new reporting rate is 10 s		Passed

2008-04-16 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		Passed
Change of heading from 0°to 359°	Check that the reporting rate is not increased		Passed
Speed = 10 kn Heading = 0	Check that reporting rate is 10 s		Passed
Speed = 10 kn Increase heading by 10 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate		Passed
	Check that new rate is established immediately (within 150 slots)	Retest 2009-01-20 Ba: • On channel A the Tx starts at the next possible slot interval • On channel B the first possible interval is not used. Therefore the start of the increased reporting rate is not within 4 s. Retest 2009-03-30 Ba: On channel A and B the next possible slot interval is used	Passed Passed
	Check that new reporting rate is 3 1/3 s		Passed
Speed = 10 kn Stop Increasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)		Passed
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change		Passed
	Check that new reporting rate is 10 s again		Passed
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		Passed
	Check that new rate is established immediately (within 150 slots)	Retest 2009-01-20 Ba: • On channel A the Tx starts at the next possible slot interval • On channel B the first possible interval is not used. Therefore the start of the increased reporting rate is not finished within 4 s. Retest 2009-03-30 Ba: 2 tests have been performed: Test 1: • On channel A the transmission of the additonal messages starts after 15 min heading change • At the end of the increased reporting rate one of the basic position reports (Slot 656) is finished. • One of the additional msg 3 on channel A is very near to one of the basic msg 1 (slot 473 / 488) The selection intervals should be checked. Test 2: On channel A the increased reporting rate starts about 12 s after heading change condition Retest 2009-06-24 Ba: The reporting schedule at heading change is correct.	Passed Passed
	Check that new reporting rate is 2 s		Passed
Speed = 15 kn Stop decreasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)		Passed
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change		Passed
	Check that new reporting rate is 6 s again		Passed
Speed = 25 kn	Wait until speed is 2 s with msg type 1		
Speed = 25 kn Increase heading by 10 degr. steps sometimes	Check that no change		Passed
Speed = 25 kn Stop Increasing heading	Check that no change		Passed

2008-04-18 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		Passed
Speed = 15 kn	Check that reporting rate is 6 s		Passed
Speed sensor unavailable (internal source made unavailable)	Record time from stopping speed input to reverting report rate	UTC 13:54:51 The reporting interval reverts to 10 s after 3 min	Passed
	Check that new reporting rate is 10 s		Passed

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)

2008-04-18 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		Passed
Nav. status = 1 (at anchor) Speed = 2 kn	Check that reporting rate is 3 min	UTC 11:41	Passed
	Check that the position report is interleaved with the msg 5		Passed
Nav. status = 1 Speed = 4 kn	Check that reporting rate is 10 s	UTC 12:00	Passed
Nav. status = 5 (moored) Speed = 2 kn	Check that reporting rate is 3 min	UTC 12:01	Passed
Nav. status = 2 (not under command) Speed = 2 kn	Check that reporting rate is 3 min	The reporting rate is 10 s	Passed
Nav. status = 6 (Aground) Speed = 2 kn	Check that reporting rate is 3 min	The reporting rate is 10 s	Passed
Nav. status = 3 or other Speed = 2 kn	Check that reporting rate is 10 s		Passed

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.
Therefore we accept both reporting rates (3 min and 10 s) for the navigational states “not under command” and “aground”.

2008-04-14 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		Passed
Change Nav status to “at anchor”	Check that the used slots are release by time-out 0 and slot offset = 0k		Passed
	Record if the slots are forced to time-out 0 or if they are released after count down to 0		
	Check that the position reports are transmitted in RATDMA mode using msg 3		Passed
Change Nav status back to 0	Check that a procedure like network entry is performed		Passed

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.

2008-05-28 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	UTC 12:56	Passed
In assigned mode • change NavStatus to 1 (at anchor)	Check that Navstatus has no effect: EUT maintains assigned mode	UTC 12:58	Passed
In autonomous mode: NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd	Check that the assignment command is accepted	UTC 13:27	Passed
	• After a slot assignment with Nav status 1 and SOG < 3 kn the EUT does not enter a 3 min schedule but there is an increasing number of msg 3 transmissions until the EUT performs an automatic restart. • During the assigned mode there are some unwanted message 3 See diagrams and log files of 3 tests		
Retest	Retest 2008-09-25 Ba: In the retest the following errors have been found:		
	After end of time-out 1 there is a automatic restart Retest 2009-01-14 Ba: There is no restart during the test		Passed
	After the automatic restart the EUT does not get a position, either internal nor external Retest 2009-01-14 Ba: There is no restart during the test		Passed
	The previous 3 min reporting schedule continues during the assigned mode phase. It has to be replaced by the assigned mode reporting rate. Retest 2009-01-14 Ba: No change, the 3 min reporting schedule continues in parallel to the assigned reporting rate. Retest 2009-03-30 Ba: The 3 min reporting schedule stops after the next transmission of msg 3 on each channel.		Passed

	In the frames after additional transmissions (msg 5, msg 3 from the 3 min schedule) there are no position reports in the slots near the slots of the additional transmissions. Retest 2009-01-14 Ba: There is a similar problem: Before transmission of msg 5 there is on message 2 missing. The same transmission is missing in the following slot. It seems that the message was intended to be used to allocate the slots for message 5, but the not really used for it. Retest 2009-03-30 Ba: There are no messages missing		Passed
	In test 1 (with a rate assignment with increment 6 (45s) there are only 2 msg 2 on channel A, on channel B there are 50 transmissions as required. The next position report on channel B in the correct slot is a message 3 instead of message 2, all other message 2 are missing. Retest 2009-01-14 Ba: This problem was not found during retest		Passed
	Retest 2009-03-30 Ba: 2 frames after end of assigned mode one of the assigned mode message is transmitted again (msg 2 in slot 50 of UTC 11:07) Retest 2009-06-24 Ba: The end of slot assignment is correct, there are no further message of the assigned mode.		Passed
Nav Status = 0, speed = 10 kn • Send assignment	Check that assignment command is executed	UTC 13:44	Passed
• Increase speed to 15 kn	Check that EUT maintains assignment mode	UTC 13:45	Passed
• Increase speed to 25 kn	Check that EUT increases reporting rate to 2 s and	UTC 13:46	Passed
	Check if msg type = 1 or msg type 2 is used (rescheduling with msg 3)	Message type = 1	Passed

NavStatus = 0, Speed = 15 kn: • Send assignment cmd	Check that EUT changes to assigned mode	UTC 13:57	Passed
In assigned mode: • Change heading	Check that reporting rate is increased to 2 s		Passed
	Check the method of increasing the reporting rate (msg 3 inserted between msg 1 or 2)	Additional messages are inserted between the basic transmissions	Passed
	In a test with a slot assignment of 125 slots the EUT stopped transmission after about 40 s and continued transmission in assigned mode after the end of the increased reporting rate (50 s after end of heading change). The VDO output continued but the messages were not received by the test equipment. See diagram and log file <u>Retest 2008-09-26 Ba:</u> Cannot be retested because the EUT restarts when receiving the second message 16 (one frame after the first message 16) <u>Retest 2009-01-15 Ba:</u> The reporting rate was increased correctly during heading change. There was no restart.		Passed

2008-05-28 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	UTC 14:11	Passed
In assigned mode • change NavStatus to 1 (at anchor)	Check that Navstatus has no effect: EUT maintains assigned mode		Passed
In autonomous mode: NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd	Check that the assignment command is accepted	UTC 14:17:26 UTC 14:21:01 The assignment command is not accepted, EUT continues 3 min reporting interval <u>Retest 2008-09-26 Ba:</u> UTC 10:59 The assignment command is not accepted. There was a restart about 90s after the message 16. This is nearly the time of the next message 3 in the 3 min. schedule <u>Retest 2009-01-13 Ba:</u> The assignment command is accepted (test with slot increment = 300) After end of time-out there is one transmission of msg 3 on each channel in the schedule 4min/2min, then Tx of msg 3 stops. Tx of msg 5 continues. <u>Retest 2008-01-14 Ba:</u> A repetition of the test with slot increment = 100 is ok In a second test with slot increment = 300 the Tx schedule 2min/4min is (like the first test), not 3 min/3min as expected, but in this case Tx continues <u>Retest 2009-03-30 Ba</u> The transmission schedule of message 3 after the assignment is correct.	Passed

	Retest 2009-03-30 Ba: With repeated msg 16 the time-out values in msg 2 are set to a new random value at each received msg 16. This results in never reaching time-out 0 and changing the Nominal transmission slot. So possible collision will not be resolved. The time-out value should be handled exactly as in autonomous reporting intervals, only the assignment time-out timer shall be reset at each received message 16. Retest 2009-06-26 Ba: The time-out values are not reset and count down to 0.		Passed
	Retest 2009-03-30 Ba: 2 frames after end of assigned mode one of the assigned mode messages is transmitted again (msg 1 in slot 54 of UTC 11:28) Retest 2009-06-26 Ba: There are no further messages after end of assigned mode		Passed
Nav Status = 0, speed = 10 kn • Send assignment	Check that assignment command is executed	UTC 14:22 The change of speed and nav status is not recognized. The EUT continues reporting interval of 3 min. UTC 14:30: Assignment command is accepted Retest 2008-09-29 Ba: The change of speed and nav status is recognized. The EUT changes to 10 s reporting rate	Passed Passed
• Increase speed to 15 kn	Check that EUT maintains assignment mode	UTC 14:32	Passed
• Increase speed to 25 kn	Check that EUT increases reporting rate to 2 s and	UTC 14:33	Passed
	Check if msg type = 1 or msg type 2 is used (rescheduling with msg 3)	Message type = 1	Passed

NavStatus = 0, Speed = 15 kn: • Send assignment cmd	Check that EUT changes to assigned mode	UTC 14:39 Assignment command is not accepted Retest 2008-09-29 Ba: Assignment command is not accepted Retest 2009-01-14 Ba: The assignment command is accepted. There is a rescheduling to the same slots as before, using message 23. This is unnecessary because the reporting rate is not changed. Only the message type should be changed from 1 to 2 to indicate that the rate assignment has been received. Retest 2009-03-30 Ba: There is no rescheduling after the end of assigned mode	Passed
In assigned mode: • Change heading	Check that reporting rate is increased to 2 s	UTC 14:46 The reporting rate is not increased, it remains at 6 s and msg type = 2 Retest 2008-09-29 Ba: The message type is changed to 1 but the reporting rate is not increased. More errors see below. Retests 2009-01-14 Ba: The reporting rate is increased to 2 s	Passed
	Check the method of increasing the reporting rate (msg 3 inserted between msg 1 or 2)	Retests 2009-01-14 Ba:	Passed
NavStatus = 0, Speed = 10 kn: • Send assignment cmd	Check that EUT changes to assigned mode		Passed

In assigned mode: • Change heading	Check that reporting rate is increased to 2 s	The reporting rate is not increased, it remains at 6 s and msg type = 2 (see diagram) Retests 2008-09-29 Ba: No change, the reporting rate is not increased, it remains at 6 s and msg type = 2 Retests 2009-01-14 Ba: The reporting rate is increased to 2 s	Passed
2008-09-29: During these tests the following problems have been observed			
Start of EUT with nav state = 15 and SOG = 2 kn	For the first 11 frames there are transmissions only on channel A, with 20 s reporting rate. There is the first transmission of message 3 at the correct time but all further messages on channel B are missing. After 11 frames there is a complete rescheduling to the correct transmission schedule.		
	All messages are type 3, the EUT does not change after one frame to message type 1		
	After 6 frames there is a timing shift by 1 slot (e.g. from slot 624 to 623)		
	Retest 2009-01-15 Ba: • The transmissions at the start of EUT are correct. • There are some incorrect VDO outputs which are not transmitted Retest 2009-03-31 Ba: (UTC 13:18 in log file) Same as before. There are 2 VDO with channel A and B but no transmission. Retest 2009-06-26 Ba: When the unit is switched on, the position is received and an area in use is detected then there are normally 2 VDOs of message 1 which are not transmitted. It seems that they have been planned before the area in use has been detected but the transmission is cancelled. It is correct that the transmission is cancelled but the VDO outputs should also be cancelled. Retest 2009-07-22 Ba: There was no unexpected VDO output	Passed Passed

Rate assignment 100 (6 s) at SOG = 10 kn	The "Number of slots" value in the comm state is 7 instead of 0. This means reservation of 3 slots and an additional slot offset of 8192. Therefore the slot allocation is incorrect. The same happens in all other tests with rate assignment Retest 2009-01-15 Ba: The number of slots is 0	Passed
	At time-out 4 the Slot number in the comm state is incorrect (1011 instead of 253 and 1017 instead of 259, the difference in both cases is 758). The same error (1017 instead of 259) is found in the next test with heading change. This error have been found also in other tests, always at time-out 4 Retest 2009-01-15 Ba: Again at time-out 4 (after msg 3 in the previous frame in the same slot) the slot number is incorrect (1044 instead of 157). Similar errors found in other tests Retest 2009-03-30 Ba: Still the same problem at time-out 4. See diagram Retest 2009-06-26 Ba: The incorrect slot-number at time-out 4 has not been found	Passed
	Except in one transmission interval (slot 500) there are transmissions only on channel B. The transmission on channel B stops at time-out 0 (slot offset = 0) but continues in the next frame in an unallocated slot Retest 2009-01-15 Ba: The channel usage is correct, transmission on both channels as expected	Passed
	Retest 2009-01-15 Ba: The slots for message 5 are not allocated during assigned mode and after assigned mode. This seems to be the same problem as reported in 16.6.3 add 1 Retest 2009-03-30 Ba: Message 5 is allocated during and after assigned mode.	Passed
Heading change in assigned mode (100 = 6s) and with SOG = 15 kn	At transmission of message 5 there are 2 message 3 to allocate msg 5. For the next 5 frames the transmission of the 2 additional message 3 continues. Retest 2009-01-15 Ba: During the test there were no repetitions of message 3 to allocate msg 5 in the next frames	Passed
Retest 2009-01-14 Ba: Further errors found		
Change of reporting rate from 3 min to 6 s	After changing SOG from 2 to 15 kn and Nav status from 1 to 0 the reporting rate is changed from 3 min to 6 s. The transition is very confusing and results in transmission on channel B only, with the correct rate for this channel of 12 s. On channel A there are no further transmissions of positon reports Retest 2009-03-31 Ba: The transition from 3 min to 6 s is correct	Passed Passed

Unexpected msg 3	During the test of heading change at SOG = 10 kn and rate assignment of 6 s there is an unexpected message 3 (Frame 15:43, slot 720) Retest 2009-03-30 Ba: No unexpected message 3 found		Passed

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.

2008-04-21 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		Passed
b) Change static data using SSD sentence short time after regular msg 5	Check that msg 5 is transmitted within 1 min		Passed
	Check that msg 5 is transmitted only if an item has been changed	Msg 5 is transmitted after each SSD input Retest 2008-09-30 Ba: Msg 5 is transmitted only when data are changed	Passed
Wait for next msg 5	Record if the next msg 5 is transmitted: • 6 min after regular msg 5 or • 6 min after additional msg 5	The next msg 5 is transmitted 6 min after the additional message 5	
Change voyage related data using VSD sentence	Check that msg 5 is transmitted within 1 min		Passed
	Check that msg 5 is transmitted only if an item has been changed	Msg 5 is transmitted after each VSD input Retest 2008-09-30 Ba: Msg 5 is transmitted only when data are changed	Passed
Change static data using MKD	Check that msg 5 is transmitted within 1 min		Passed
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. Retest 2008-09-30 Ba: Msg 5 is transmitted before the next position report	Passed

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.

2009-06-26 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	Readout on PI port by proprieatary sentence: $xxAIQ,PSAEAISLFS	Passed
Read out recorded data	Check that all switch off times > 15min are correctly recorded	There are some differences in the time, e.g.: Switch off time: 15:37, record: 15:21 Has to be checked further. It may depend on sampling rate of the time. Retest 2009-07-22 Ba: The times are recorded correctly	Passed
If the EUT supplies a “silent mode” (no transmission)	Check that all silent mode times > 15min are correctly recorded	There are no record when the transmission is inhibited by - ACA with Tx/Rx mode 3 - “Transmitter off” on MKD Retest 2009-07-22 Ba: - ACA with Tx/Rx mode 3 - “Transmitter off” on MKD are correctly logged in the security log	Passed

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.

2008-05-29 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		Passed
b) Switch off EUT for approx. 0.5 s	Check that EUT starts transmission within 2 min		Passed
Set the EUT to the default MMSI (normally 000000000)			
Switch on EUT	Check that EUT does not start transmission	EUT does not start transmission with MMSI 0	Passed

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.

2008-07-16 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 25 kHz bandwidth	Check that channels are used		Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed
b) Enter by using msg 22: 1 duplex channel 25 kHz spacing 25 kHz bandwidth	Check that channels are used		Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed
c) Enter by ACA sentence: 1 duplex channel 25 kHz spacing 12.5 kHz bandwidth	Check that channels are used		Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed
d) Enter by DSC 2 simplex channels 12.5 kHz spacing 12.5 kHz bandwidth	Check that channels are used		Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed

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.

This test should be done as the last test to be able to do all other tests in case of transmitter damage.

2009-06-26 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		Passed
Short circuit of VHF antenna terminal	Check that EUT starts transmission within 2 min after refitting the antenna		Passed

2.9 14.9 Alarms and indicators, fall-back arrangements

(6.10)

2008-05-29 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 no ALR output when no alarm is active Retest 2009-01-15 Ba: Same result Retest 2009-04-06 Ba: No change Retest 2009-06-26 Ba: All alarms are output every minute, with status “V,V” if the alarm is not active.	Passed

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”.

2008-05-29 Ba	Test details - Loss of power supply		
Test item	Check	Remark	Result
Switch off power supply	Check that alarm relay output is active.		Passed

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.

2008-05-29 Ba	Test details - Tx malfunction		
Test item	Check	Remark	Result
Disconnect VHF antenna or: make TX active between scheduled slots (e.g. CW carrier)			
Stop of transmission	Check if transmission is stopped	Tx is stopped, no VDO output with channel	Passed
ALR output	Check that ALR sentence ID 001 is output at PI		Passed
ALR output repetition	Check that the ALR sentence is repeated with a rate of 30 s		Passed
Alarm relay	Check that alarm relay is activated		Passed
MKD display	Check that the alarm is displayed on the MKD	An “Alarm” softkey is popping up, and the alarm is displayed in the alarm list	Passed
Send an ACK sentence	Check that alarm relay deactivated		Passed
	Check that ALR sentence is updated		Passed
	Check that alarm display on the MKD is updated	The alarm list is updated, the “Alarm” softkey is not removed	Passed
Reconnect VHF antenna	Check that ALR sentence is updated		Passed
	Check that alarm display on the MKD is updated	The alarm list is updated and the “Alarm” softkey is removed	Passed

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.

2008-05-29 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		Passed
ALR output	Check that ALR sentence ID 002 is output at PI		Passed
MKD display	Check that the alarm is displayed on the MKD		Passed
Alarm relay	Check that alarm relay is activated		Passed
Send an ACK sentence	Check that alarm relay deactivated		Passed
	Check that ALR sentence is updated		Passed
	Check that alarm display on the MKD is updated		Passed
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		Passed
	Check that ALR sentence is updated		Passed
	Check that alarm display on the MKD is updated (the alarm indication is cleared)		Passed
Connect VHF antenna	Check that ALR sentence is updated		Passed

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.

2010-03-16 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		Passed
ALR output	Check that documentation describes that an ALR sentence with ID 003 (RX1), ID 004 (RX2) and ID 005 (DSC) is sent.		Passed

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.

2008-05-29 Ba	Test details - UTC clock lost		
Test item	Check	Remark	Result
Disconnect GNSS antenna			
Continuation of operation	Check that transmission of position report continues		Passed
Synchronisation	Check that EUT switches to indirect synchronisation		Passed
TXT output	Check that a TXT sentence with ID 007 is output at PI		Passed
Alarm relay	Check that the alarm relay output is not activated	The alarm relay is activated. There is a proprietary alarm 053 GPS antenna not connected or defective. This seems to be the reason that the alarm relay is activated. This is acceptable. But this alarm is not displayed on the MKD and therefore cannot be acknowledged. (UTC 08:30) Retest 2008-09-30 Ba: UTC 08:12 Not changed The reason may be that there is not yet a new software version of the MKD Retest 2009-04-06 Ba: It seems that the proprietary alarm 053 has been removed. This is not a good solution. We observe a lot of problems with defective internal GPS function. Therefore an alarm is very important and will be required in the next version of the IEC 61993-2 Retest 2009-06-26 Ba: According to manufacturer's information this alarm is implemented if the MKD is connected via LAN and not via serial port because the transponder in that case assumes that a RADARPILOT or CHARTPILOT is connected.	Passed
MKD display	Check that the status display of the MKD is updated		Passed

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.

2008-05-29 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		Passed
DTE flag	Check that the DTE flag in msg 5 is set to 1		Passed
ALR output	Check that ALR sentence ID 008 is output at PI		Passed
Alarm relay	Check that alarm relay is activated		Passed
MKD display	Check that loss of connection to the transponder is displayed on the MKD		Passed
Send an ACK sentence	Check that alarm relay deactivated		Passed
	Check that ALR sentence is updated		Passed
Reconnect MKD	Check that ALR sentence is updated		Passed
MKD display	Check that the MKD display is updated		Passed

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.

2008-04-21 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: no RAIM, external: RAIM active.			
No sensor data: Changing upwards			
f) Start with: • No external GNSS input • No Internal GNSS	Check that default position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag = 0		Passed
	Check that ALR message with ID 026 (No sensor position) is output on PI every 30 s		Passed

e) Change from f: • No external GNSS input • Activate internal GNSS	Check that internal position is used		Passed
	Check that position accuracy flag = 0	PA flag is set to 1 after the start of RAIM	Passed
	Check that RAIM flag is according to internal sensor (= 1)	RAIM flag = 1 after 2 s	Passed
	Check that msg 5 is output with new (internal) ref. point		Passed
	Check that ALR message with ID 026 is updated		Passed
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that the alarm on MKD according to ALR ID 026 is updated		Passed
	Check that status display of MKD is updated according to TXT ID 025 and ID 028		Passed
	Check that status has been changed after 30 s	The status is not change consistently: • The TXT sentences are output 30 s after GPS becoming valid. • The position in message 1 is changed to the internal position immediately after GPS becomes valid. It should change 30 s after GPS becoming valid, at the same time as the TXT output TXT output and position in message 1 should change at the same time <u>Retest 2008-09-30 Ba:</u> The position is changed to the internal position after 30s, at the same time as the TXT output	Passed Passed

d) Change from e: • Internal GNSS is available • Apply external GNSS input	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is according external sensor (=0)		Passed
	Check that msg 5 is output with new (external) ref. point		Passed
	Check that ALR message with ID 025 is updated		Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that the alarm on MKD according to ALR ID 025 is updated		Passed
	Check that status display of MKD is updated according to TXT ID 022 and ID 027		Passed
	Check that status has been changed after 30 s	Same as above: • TXT after 30 s • Position in msg 1 immediately Retest 2008-09-30 Ba: The position is changed to the external position after 30s,	Passed Passed
a) Change from d: • Internal GNSS • Change external mode to DGNSS	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Message 5	*REC:* There is a transmission of message 5. Remark: It is not necessary to output message 5 when the position is changed to differential mode because the content of message 5 is not changed. Only the content of message 1 is changed (PA flag) Retest 2008-09-30 Ba: UTC 08:29 No change Retest 2009-04-06 Ba: There is no unneccessary transmission of msg 5	Passed
	Check that TXT sentence with ID 021 is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 021		Passed

	Check that status has been changed after 30 s	Same as above: • TXT after 30 s • PA flag in msg 1 is changed to 1 immediately <u>Retest 2008-09-30 Ba:</u> UTC 08:29 No change, the PA flag is not changed consistent with the TXT output <u>Retest 2009-01-16 Ba:</u> The PA flag is changed after 30 s, at the same time as the TXT output <u>Retest 2009-04-06 Ba:</u> The PA flag is again changed immediately to 1 after changing the external mode to DGNSS. It should be changed after 30 s, at the same time when the TXT 021 is output <u>Retest 2009-06-25 Ba:</u> The PA flag is changed to 1 at the time of TXT 021 output (UTC 09:39)	Passed Passed Passed

Highest Level: Changing downwards			
d) Change from a: • Internal GNSS available • Change external sensor mode to GNSS	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that TXT sentence with ID 022 is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
	Check that status has been changed after 5 s	• PA flag is changed after 30 s • TXT output after 35 s Both should change after 5 s Retest 2008-09-30 Ba: UTC 08:32 After about 10s the EUT switches to internal position. An incorrect ALR 025 External EPFS lost is generated After 60 s the EUT switches back to external position with PA = 0 Retest 2009-01-16 Ba: After 10 s the PA flag is set to 0 and a TXT ID 22 is output Retest 2009-04-06 Ba: The TXT ID 22 is output 5 s later than setting the PA flag back to 0. It should be at the same time Retest 2009-06-25 Ba: The PA flag is changed to 1 at the time of TXT 021 output (UTC 09:40)	Passed Passed

e) Change from d: • Internal GNSS available • Remove external GNSS input	Check that internal position is used		Passed
	Check that position accuracy flag = 0	PA flag = 1 by RAIM function	Passed
	Check that RAIM flag is set according to documentation of internal GPS (=1)		Passed
	Check that msg 5 is output with new ref. point		Passed
	Check that ALR message with ID 025 (external EPFS lost) is output on PI		Passed
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that an alarm according to ALR message is displayed on MKD		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
	Check that status has been changed after 5 s	• Position in msg 1 is changed after 30 s • TXT output after 35 s Both should change after 5s Retest 2008-09-30 Ba: UTC 08:36 Position and TXT output are changed after 10 s. This is acceptable	Passed
f) Change from e: • No external GNSS input • Disable internal GNSS	Check that default position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag = 0		Passed
	Check that ALR message with ID 026 (No sensor position) is output on PI		Passed
	Check that an alarm according to ALR message is displayed on MKD		Passed
	Check that status has been changed after 5 s	• The position is changed after 2 s to default Should be after 5 s Retest 2008-09-30 Ba: UTC 08:40 The position is changed after 5 s	Passed

GPS fail	When running with the internal GPS every few minutes there is a default position in the VDO sentence for 1 s. At this time there are: - ALR output ID 26, 29, 30 with status A - 1 s later an ALR output ID 26, 29, 30 with status V - TXT output 36 Channel management parameters changed - ACA output with the active Area, set to "in-use" The ACA output is unnecessary anyway because the area use has not changed. Retest 2008-09-30 Ba: The internal GPS runs stable	Passed
Output error	When the position is changed from default (no position) to an external position there is an error in the output sentences. One sentence is cut (VDO or ACA) and not finished before the next sentence is output. This does not happen when changing from a valid internal position to external position Retest 2008-09-30 Ba: UTC 08:46 The output sentences are correct	Passed

2009-01-16 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:	Check that external position is used		Passed
• Internal GNSS is available	Check that position accuracy flag = 0		Passed
• External GNSS input	Check that RAIM flag = 0		Passed

b) Change from d: • External mode is GNSS • Apply correction data by msg 17	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that RAIM flag is set according to internal GNSS (=1)		Passed
	Check that msg 5 is output with new (internal) ref. point		Passed
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 024 and 028	MKD displays: Position: internal DGNSS SOG/COG: internal The source of correction data (Msg 17) is not displayed Retest 2009-04-03: The source of correction data is displayed	Passed Passed
	Check that status is changed after 30 s		Passed
	The following errors have been found during this phase of the test		
	About 4 s after start of message 17 the EUT switches to the default position (no position). There is an ALR output 26 no sensor position in use. There is no reason not to output a valid position because the internal and external positions are available Retest 2009-04-03: The EUT does not switch to default position. There is no ALR 26 output		Passed
	There is an TXT 36 output (Channel management parameters changed) and an ACA output indicating that the default channels are in use. This is incorrect because the channels of the area setting are still in use. It is correct to continue using the area which was in use before the position was lost. Retest 2009-04-03: There is no TXT 36 and ACA output		Passed
	There is an unneccessary output of message 5. It is not necessary to output message 5 because the position source has not really changed to another position source. Unnecessary channel load should be avoided. There is the correct transmission of message 5 when the EUT switches to the internal source. Retest 2009-04-03: There is no unnecessary transmission of message 5		Passed
	Immediately before changing to the internal source there is an incorrect ALR output ID 025 External EPFS lost. This is incorrect because the external EPFS is still available. Retest 2009-04-03: There is no ALR ID 025 output		Passed

a) Change from b: • Change external mode to DGNSS • Internal DGNSS (msg 17)	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that RAIM flag is set according to external GNSS (=0)		Passed
	Check that msg 5 is output with new (external) ref. point		Passed
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 021 and ID 027		
	Check that status is changed after 30 s		Passed
Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by msg 17 • Change external sensor mode to GNSS	Before changing to the internal source the following errors occur: (as described in detail above)		
	• Changing to “No position” with output of ALR 026 • PA flag = 1 together with the default position • Incorrect output of TXT 36 and ACA with high sea in use • Incorrect output of ALR 025 before changing to internal position • Unnecessary output of message 5 Retest 2009-04-03: The above errors did not occur		Passed
	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentences		Passed
	Check that status is changed after 5 s	EUT switches to internal position after about 9 s	Passed

d) Change from c: • External GNSS input • Remove msg 17 (correction data for Internal GNSS)	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is set according to external sensor input data		Passed
	Check that msg 5 is output with new ref. point		Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
		There is an incorrect output of TXT 023 Internal DGNSS in use (beacon). No beacon data are applied at this time Retest 2009-06-25 Ba: There is no output of TXT 023 (UTC 10:21:10)	Passed
		There is an incorrect output of TXT 07 UTC clock lost Retest 2009-06-25 Ba: There is no output of TXT 007 UTC clock lost	Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
	Check that status is changed after 5 s + max age of correction data	Status is changed after about 1 min which seems to be the max age of correction data	Passed

2009-01-16 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		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag = 0		Passed

c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon	Before changing to the internal source the following errors occur: (as described in detail above)		
	• Changing to "No position" with output of ALR 026 • PA flag = 1 together with the default position • Incorrect output of TXT 36 and ACA with high sea in use • Incorrect output of ALR 025 before changing to internal position • Unnecessary output of message 5 Retest 2009-04-03: The above errors did not occur		Passed
	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that msg 5 is output with new (internal) ref. point		Passed
	Check that TXT sentence with ID 023 (position) and ID 027 (SOG/COG) is output on PI	MKD displays: Position: internal DGNSS SOG/COG: internal The source of correction data (beacon) is not displayed Retest 2009-04-03: The source of correction data is correctly displayed	Passed Passed
	Check that status display of MKD is updated according to TXT ID 023 and 028		
a) Change from C: • Change external mode to DGNSS • Internal DGNSS (beacon)	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that msg 5 is output with new (external) ref. point		Passed
	Immediately before changing to the external EPFS there are TXT output ID 23 and 28. This is not really incorrect because at this time the text messages are valid, but it does not make sense to output these sentences 1 second before the source is changed to external source Retest 2009-04-03: There is no output of TXT ID 23 and 28 before changing to external position.		Passed
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI	• TXT 021 is ok • TXT 027 is output to early, at 12 s, when the internal SOG/COG is still in use Retest 2009-04-03: TXT 27 is output at the same time as TXT 021, when the position and SOG/COG source is changed	Passed Passed
	Check that status display of MKD is updated according to TXT ID 021		Passed
	Check that status is changed after 30 s		Passed

Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by beacon • Change external sensor mode to GNSS	Before changing to the internal source the following errors occur: (as described in detail above)		
	• Changing to "No position" with output of ALR 026 • PA flag = 1 together with the default position • Incorrect output of TXT 36 and ACA with high sea in use • Incorrect output of ALR 025 before changing to internal position • Unnecessary output of message 5 <u>Retest 2009-04-03:</u> The above errors did not occur		Passed
	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI	No output of TXT 023 and 028 <u>Retest 2009-04-03:</u> There is an output of TXT 023 and 028.	Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
d) Change from c: • External GNSS input • Remove beacon correction data for Internal GNSS Status change time	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is set according to sensor input data		Passed
	Check that msg 5 is output with new ref. point		Passed
		There is an incorrect output of TXT 07 UTC clock lost <u>Retest 2009-06-25 Ba:</u> There is no output of TXT 007 UTC clock lost (UTC 09:44)	Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
	Check that status is changed after 5 s		Passed

2009-01-16	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		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag = 0		Passed
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon	Errors before changing to internal position	There are the same errors as in the previous test at start of beacon data Retest 2009-04-03: The above errors did not occur	Passed
	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that msg 5 is output with new (internal) ref. point		Passed
		There is an incorrect output of TXT 07 UTC clock lost Retest 2009-06-25 Ba: There is no output of TXT 007 UTC clock lost (UTC 10:22)	Passed
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 023	MKD displays: Position: internal DGNSS SOG/COG: internal The source of correction data (beacon) is not displayed Retest 2009-04-03: The source of correction data is correctly displayed	Passed Passed

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		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 024 is output on PI	• The output of TXT ID 024 is ok. • Immediately before the output of TXT ID 024 there is in unnecessary and confusing output of TXT ID 023 Retest 2009-04-03: There is no TXT ID 023 before the output of TXT ID 024	Passed Passed
	Transmission of message 5	There is an unneccessary output of msg 5. A transmission of msg 5 is not necessary because the position source does not change and therefore the dim./ref. parameter are not changed Retest 2009-04-03: There is no unneccessary output of msg 5	Passed
	Check that status display of MKD is updated according to TXT ID 024	The MKD display does not change because it does not display the source of correction data (Msg 17) Retest 2009-04-03: The source of correction data is correctly displayed	Passed
a) Change from b: • Change external mode to DGNSS • Internal DGNSS (msg17)	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that msg 5 is output with new (external) ref. point		Passed
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 021		Passed
Status change time	Check that status is changed after 30 s		Passed

Highest Level: Changing downwards			
b) Change from a: • Msg 17 for internal DGNSS • Internal DGNSS by beacon • Change external sensor mode to GNSS	Before changing to the internal source the following errors occur: (as described in detail above)		
	• Changing to "No position" with output of ALR 026 • PA flag = 1 together with the default position • Incorrect output of TXT 36 and ACA with high sea in use • Incorrect output of ALR 025 before changing to internal position • Unnecessary output of message 5 <u>Retest 2009-04-03:</u> The above errors did not occur		Passed
	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence	MKD displays: Position: internal DGNSS SOG/COG: internal The source of correction data (beacon) is not displayed <u>Retest 2009-04-03:</u> The source of correction data is correctly displayed	Passed Passed
c) Change from b: • External sensor mode is GNSS • Internal DGNSS by beacon • Stop msg 17	Before changing to the internal source the following errors occur:		
	• At 09 s there is an incorrect ALR output 025 External EPFS lost • At 60 s there is an incorrect TXT output 07 UTC clock lost • At 63 s the EUT switches to the external position source. This is incorrect because the internals differential position is still available (by beacon input) • At 1 min 30s the EUT switches to default position, incl. ALR 026 and TXT 36 with ACA output and unnecessary output of msg 5 <u>Retest 2009-04-03:</u> The above errors did not occur		Passed
	Check that internal position is used	• The internal position is used • It takes 2 min until the internal position is used. It should be used continuesly <u>Retest 2009-04-03:</u> The internal position is used continously	Passed Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 023 is output on PI		Passed

	Check that status display of MKD is updated according to TXT sentence	The MKD display does not change because it does not display the source of correction data (Msg 17) Retest 2009-04-03: The source of correction data is correctly displayed	Passed
d) Change from c: • External GNSS input • Remove beacon correction data for internal GNSS	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is set according to sensor input data		Passed
	Check that msg 5 is output with new ref. point		Passed
		There is an incorrect output of TXT 07 UTC clock lost Retest 2009-06-25 Ba: There is no output of TXT 007 UTC clock lost (UTC 10:27)	Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
Status change time	Check that status is changed after 5 s		Passed

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.

2008-04-21 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		Passed
	Check that alarm relay is inactive		Passed
	Check that no ALR output is active		Passed
a) Disconnect heading and ROT • No heading • No ROT	Check that heading in VDL = default		Passed
	Check that ROT in VDL = default		Passed
	Check that ALR message with ID 032 (heading invalid) is output on PI		Passed
	Check that ALR message with ID 035 (ROT invalid) is output on PI		Passed
	Check that alarm relay is active		Passed
	Check that an alarm according to ID 032 is displayed on MKD		Passed
	Check that an alarm according to ID 035 is displayed on MKD		Passed
b) Reconnect heading and ROT • Valid heading • Valid ROT	Check that heading in VDL ok		Passed
	Check that ROT in VDL ok		Passed
	Check that ALR message with ID 032 (heading valid) and status V is output on PI		Passed
	Check that ALR message with ID 035 (ROT valid) and status V is output on PI		Passed
	Check that TXT message with ID 031 (Heading valid) is output on PI		Passed
	Check that TXT message with ID 033 (ROT in use) is output on PI		Passed
	Check that alarm relay is inactive		Passed
	Check that the alarm display on MKD is updated		Passed
	Check that the status display on MKD is updated (heading and ROT valid)		Passed

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		Passed
	Check that ROT in VDL is - 127 for ROT < -10 °/min, turning left		Passed
	Check that TXT message with ID 034 (other ROT in use) is output on PI		Passed
	Check that the status display on MKD is updated (other ROT)		Passed
d) Change ROT source back to TI • Valid heading • ROT from TI	Check that ROT in VDL ok		Passed
	Check that TXT message with ID 033 (ROT in use) is output on PI		Passed
	Check that the status display on MKD is updated (ROT in use)		Passed
a) Disconnect ROT • Valid heading • No ROT Change heading > 5 °/30s	Check that ROT in VDL is + 127 for increasing heading	ROT = default	Passed
	Check that ROT in VDL is - 127 for decreasing heading		N/A
	Check that TXT message with ID 034 (other ROT in use) is output on PI		N/A
b) Reconnect ROT • Valid heading • Valid ROT from TI	Check that ROT in VDL ok		Passed
	Check that ALR message with ID 035 (ROT valid) and status V is output on PI		Passed

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.

2008-04-21 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 • No external Position • No external speed • No internal Position • No internal speed	Check that SOG = default		Passed
	Check that COG = default		Passed
	Check that alarm relay is active		Passed
	Check that the status according to ALR msg ID 029/30 is displayed on MKD		Passed
b) Activate internal GPS • Internal position • Internal speed	Check that SOG from internal GPS is used in VDL message 1,2,3		Passed
	Check that COG from internal GPS is used in VDL message 1,2,3		Passed
	Check that TXT message with ID 028 (internal speed in use) is output on PI		Passed
	Check that ALR message with ID 29 and 30 (No valid SOG/COG information) with status V is output on PI		Passed
	Check that alarm relay is inactive		Passed
	Check that the status according to TXT 28 is updated on MKD (internal SOG/COG in use)		Passed
	Check that the alarm ID 29/30 is deleted from MKD		Passed
c) Connect external speed • No external Position • External speed	Check that SOG from internal Sensor is used in VDL message 1,2,3		Passed
	Check that COG from internal Sensor is used in VDL message 1,2,3		Passed
d) Connect position (and speed) • External Position • External speed	Check that SOG from external Sensor is used in VDL message 1,2,3		Passed
	Check that COG from external Sensor is used in VDL message 1,2,3		Passed
	Check that TXT message with ID 027 (external COG/SOG in use) is output on PI		Passed
	Check that the status according to TXT msg ID 027 is displayed on MKD (external COG/SOG in use)		Passed

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		Passed
	Check that COG from internal GPS is used in VDL message 1,2,3		Passed
	Check that TXT message with ID 028 (internal speed in use) is output on PI		Passed
	Check that the status according to TXT msg ID 028 is displayed on MKD (internal COG/SOG in use)		Passed
b) Disconnect external speed • No external Position • No external speed	Check that SOG from internal GPS is used in VDL message 1,2,3		Passed
	Check that COG from internal GPS is used in VDL message 1,2,3		Passed
c) Disconnect external position and speed • No external Position • No external speed	Check that SOG from internal GPS is used in VDL message 1,2,3	• About 5 s after disconnection of external position and speed the SOG and COG is set to default, and there is an ALR output 029 and 030. • About 30 s after disconnection of external position and speed – when position is changed to internal position – the SOG and COG is set to the internal values, and the ALR output 029 and 030 are updated. So for 25 s there is an unnessessary alarm, and the SOG/COG is unnecessarily set to default. The SOG should change directly from the external to the internal values after 5 s. <u>Retest 2008-09-30 Ba:</u> UTC 09:05 The SOG is directly switched from external to internal SOG/COG	Passed
	Check that COG from internal GPS is used in VDL message 1,2,3		
	Check that TXT message with ID 028 (internal speed in use) is output on PI		Passed
	Check that the status according to TXT msg ID 028 is displayed on MKD (internal COG/SOG in use)		Passed

a) Disable internal GPS • No external Position • No external speed • No internal Position • No internal speed	Check that SOG = default		Passed
	Check that COG = default		Passed
	Check that ALR message with ID 029 (No valid SOG information) is output on PI		Passed
	Check that ALR message with ID 030 (No valid COG information) is output on PI		Passed
	Check that alarm relay is active		Passed
	Check that the status according to ALR msg ID 029/30 is displayed on MKD		Passed

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

2009-04-03 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		Passed
	Check that range and bearing of AIS targets can be displayed without horizontal scrolling		Passed

2009-04-03 Ba	Test details – Display of own ship position		
Test item	Check	Remark	Result
Internal Position	Check that the own ship position is displayed continuously		Passed
	Describe how it is displayed (in which menu/screen) and how this screen is activated	Right click on the own ship on the screen and selecting “Show own AIS data”.. Then clicking “more” until own ship position is displayed on the screen “Navigation data”	Passed
	Check that the actual source is indicated (external/internal)	On the “AIS state” screen of the own ship data display	Passed
External Position	Check that the own ship position is displayed continuously		Passed
	Check that the actual source is indicated (external/internal)		Passed

2.10.1.1 Display of received messages

2009-04-03 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		Passed
	MMSI	Recommended	Passed
	Position (RNG, BRG); Detailed check of values in next table	required	Passed
	Position (Lat,Lon)	Recommended	Passed
	Time	Not required Not displayed	---
	PA (Position accuracy) flag	Not required Retest 2009-06-26 Ba: The EUT displays “GNSS”. This seems to be the indication of the PA flag but it does not change to “DGNSS" if the PA flag = 1 Clarification required Retest 2009-07-22 Ba: With PA = 0 the EUT displays “GNSS”. With PA = 1 the EUT displays “DGNSS”	Passed
	SOG and COG	Recommended	Passed
	True heading	Recommended	Passed
	Navigational status	Recommended Test 2009-08-27 Ba: The new values of clarification 2.2 are correctly displayed	Passed Passed
	RAIM flag	Not required Not displayed	---

MSG 5 Display of static and voyage related ship data - required -	MMSI	recommended	Passed
	IMO number	Not required Not displayed	---
	Call sign	Recommended	Passed
	Name of ship	Required	Passed
	Type of ship and cargo	Recommended Is displayed. The old catogories of cargo type are displayed (A,B,C,D). Retest 2009-08-27 Ba: The catogories X, Y, Z, OS are correctly displayed	Passed Passed
	Dimension/Reference for position	Length recommended Length is displayed	Passed
	Type of EPFD	Not required Not displayed	----
	Estimated time of arrival	Not required Is displayed	Passed
	Maximum present static draught	Not required Is displayed	---
	Destination	Not required Is displayed	---
	DTE flag	Not required Not displayed	---
MSG 4 Base station report - Recommended -	MMSI	Recommended	Passed
	Position (Lat,Lon)	recommended	Passed
	Position (RNG, BRG); Check values	recommended	Passed
	Time	Not required Not displayed	---
	PA flag	Not required Not displayed	---
	RAIM flag	Not required Not displayed	---

MSG 9 SAR aircraft position report - optional -	MMSI	Recommended	Passed
	Position (RNG, BRG); Check values	Recommended	Passed
	Position (Lat,Lon)	Recommended	Passed
	Time	Not required Not displayed	Passed
	PA flag	Not required Not displayed	Passed
	SOG and COG	Recommended	Passed
	Altitude		Passed
	RAIM flag	Not required Not displayed	---
	DTE flag	Not required Not displayed	---
MSG 12/14 Safety related text message - Required -	MMSI	Required	Passed
	Text content	Required	Passed
	Broadcast or selective	Recommended Is not displayed.	---
MSG 18,19 Class B position report - required -	MMSI	Required	Passed
	Position (RNG, BRG); Check values	required	Passed
	Position (Lat,Lon)	recommended	Passed
	Time	Not required Not displayed	---
	PA flag	Not required Not displayed	---
	SOG and COG	Recommended	Passed
	True heading	Recommended	Passed
	RAIM flag	Not required Not displayed	---
	Name	Recommended,	Passed
	Type of ship and cargo	Recommended	Passed
	Dimension/Reference for position	Length recommended Length is displayed	Passed
	Type of EPFD	Not required Not displayed	---
	DTE flag	Not required Not displayed	---
MSG 24 Class B position report - required -	MMSI	Required	Passed
	Name	Recommended,	Passed
	Type of ship and cargo	Recommended	Passed
	Call sign	Recommended	Passed
	Dimension/Reference for position	Length recommended Length is displayed	Passed

MSG 21 Aids to navigation report - recommended -	MMSI	Recommended	Passed
	Type of Aids to navigation	Recommended	Passed
	Name of Aids to navigation	Recommended	Passed
	Position (RNG, BRG); Check values	Recommended	Passed
	Position (Lat,Lon)	Recommended	Passed
	PA flag	Not required	---
	RAIM flag	Not required	---
	Virtual/Pseudo AtoN flag	Recommended Not displayed	Passed
	Dimension/Reference for position	Not required Not displayed	---
	Type of EPFD	Not required Display: GNSS	Passed
	Off position indicator	Recommended Not displayed	Passed
	SOG, COG are not displayed or show default values	Not displayed	Passed
Means to select messages	Check that means to select received messages are available		Passed
Means to select data fields	Check that means to select data fields are available		Passed

2.10.1.2 Input of data

2009-04-03 Ba	Test details d) – Input of data		
Test item	Check	Remark	Result
MMSI number	Check that number can be input		Passed
	Check that input is protected		Passed
IMO number	Check that number can be input		Passed
	Check that input is protected		Passed
Call sign	Check that Call sign can be input		Passed
	Check that input is protected		Passed
Name of ship	Check that name can be input		Passed
	Check that input is protected		Passed
Navigational status	Check that data can be input		Passed
	Check if input by number or by selection of items	By selection of items	Passed
	If input by selection of items: Check that the new values of Clarifications 2.2 can be input	Test 2009-08-27 Ba: 9-13 checked, 14 (AIS SART) cannot be input	Passed
Type of ship and cargo	Check that data can be input		Passed
	Check if input by number or by selection of items	By both, selection of items and by number. It is not clear which input has priority in case of missmatch Retest 2009-06-26 Ba: The selection of items has priority. The number is automatically addapted when the setting is stored	Passed Passed
	If input by selection of items: Check that the new values of Clarifications 2.2 can be input	Test 2009-08-27 Ba: The new values can input and are correctly used	Passed

Dimension/Reference for position	Check that data for internal GPS antenna position can be input	By offset to the external data The calculation of the dim/ref is reversed: • The longitudinal offset is added to the C/D (transv.) values • The transversal offset is added to the A/B (long.) values See Note) Retest 2009-06-26 Ba: The offset of the internal AIS to the external position is correct.	Passed
	Check that data for external EPFS position can be input		Passed
Maximum static draught	Check that data can be input		Passed
Destination	Check that name of destination can be input		Passed
	Check that estimated time of arrival can be input		Passed

Note)
The configuration is done by 3 different positions:

- **a basic GPS position which is configured by 4 values like the A, B, C, D values**
- **A Conning position which is configured by an offset in longitudinal and transversion distance to the basic GPS position (positive values in direction to bow and starboard). This position is transferred to the AIS as external position**
- **An AIS position which is configured by an offset in longitudinal and transversion distance to the basic GPS position (positive values in direction to bow and starboard). This position is transferred to the AIS as internal position**
-

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.

2009-04-03 Ba	Test details) – Message transmission		
Test item	Check	Remark	Result
Transmission of safety related broadcast message	Check selection between broadcast and addressed message	"All" in the MMSI field	Passed
	Check selection of TX channel	Not possible	Passed
	Check data input	By virtual keyboard on the screen	Passed
	Check if prepared text blocks are available	Yes, 10 fixed message and 5 user definable messages	Passed
	Check if input of invalid characters (e.g. lower case letters) are inhibited	Characters are automatically converted to upper case characters	Passed
	Check display of transmission status (indication that message is transmitted)	A fail of the transmission is indicated	Passed
Transmission of addressed safety related message	Check selection of TX channel	Not possible	Passed
	Check data input	By virtual keyboard on the screen	Passed
	Check input of MMSI	Only by selection of received targets	Passed
	Check if selection of MMSI from received message (e.g. position report) is possible	Yes, it is the only way	Passed
	Check display of transmission status (indication that message is transmitted and acknowledged)	A fail of the transmission is indicated	Passed
Repetition	Check if repetition of transmission is possible without entering the data again.	Normaly ("New message" not possible. It is possible if one of the user definable messages ("User1" to "User5" is used	Passed
Transmission of other messages	Check for a sample of msg 4, 16, 17, 18, 19, 20, 21, 22 that a transmission is not possible.	Not possible	Passed

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

2009-04-03 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		Passed
	Check display of Channel A and B		Passed
	Check display of RX/TX mode		Passed
	Check display transmission power		Passed
	Check display of bandwidth		Passed
	Check display of NE point of area		Passed
	Check display of SW point of area		Passed
	Check display of transitional zone		Passed
Entry of a new area	Check selection between changing an existing area and creating a new regional area entry	A new area is entered by modification of an existing area, not overlapping	Passed
	Check input of Channel A and B		Passed
	Check input of RX/TX mode		Passed
	Check input transmission power		Passed
	Check input of NE point of area		Passed
	Check input of SW point of area		Passed
	Check input of transitional zone		Passed
	Check that the user has to confirm a second time that the new data shall be stored		Passed
Enter invalid channel	Check that entry is refused	There is only a very rough check. All channels between 0 and 2287 are accepted Retest 2009-06-26 Ba: No change, All channels between 0 and 2287 are accepted Retest 2009-07-22 Ba: The channels are exactly checked, incl. exclusion of channels 16 and 70	Passed

Enter too small area (<20 nm)	Check that entry is refused		Passed
Enter too large area (> 200 nm)	Check that entry is refused		Passed
Enter a region according to M.1371-1 A2/4.1 figure 4.1.5A (4 adjacent areas)	Check that entry is refused		Passed
Changing an existing area	Check that existing area for changes can be selected		Passed
	Check change of Channel A and B		Passed
	Check change of RX/TX mode		Passed
	Check change transmission power		Passed
	Check change of NE point of area		Passed
	Check change of SW point of area		Passed
	Check change of transitional zone		Passed
	Check that the user has to confirm a second time that the new data shall be stored		Passed
Changing of default values	Check that the default Channels (AIS1 and AIS2) cannot be changed without entering a complete area		Passed
	Check that the TX /Rx mode cannot be changed without entering a complete area		Passed
	Check that the transmission power cannot be changed without entering a complete area		Passed
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)		Passed

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.

2009-04-03 Ba	Test details - Password protection			
Input item	Level one requirement	Level 2 Recommendation	Implemented type of protection	Result
Static data				
MMSI	Required	---	Protected	Passed
IMO-Number	Required	---	Protected	Passed
Call sign	Recommended	Recommended if not level 1	Protected	Passed
Name	Recommended	Recommended if not level 1	Protected	Passed
Dimension/Reference for position	Required	---	Protected	Passed
Type of ship	Recommended		Protected	Passed
Tx off switching	Recommended if function available	---	Not protected	Passed
Voyage data				
Navigational status	Not allowed	Not recommended	Not protected	Passed
Type of cargo	Not allowed	Not recommended	Not protected	Passed
Destination	Not allowed	Not recommended	Not protected	Passed
ETA	Not allowed	Not recommended	Not protected	Passed
Maximum static draught	Not allowed	Not recommended	Not protected	Passed
Persons on board	Not allowed	Not recommended	Not protected	Passed
Other operational data				
Area settings	Not allowed	Recommended	Not protected	Passed
Message transmission	Not allowed	Recommended	Not protected	Passed
Long range confirmation	Not allowed	Not recommended	Not protected	Passed
Configuration data				
Serial port settings (Baudrate, ...)	Required	---	Protected	Passed
Long range autoackn.	Not required	Recommended	Not protected	Passed

2.10.3.3 Alarm and status display

2009-04-03 Ba	Test details - Alarms display			
ID	Test item	Check	Remark	Result
001	Tx malfunction	Check is done in 2.9.2.1		Passed
002	Antenna VSWR exceeds limit	Check is done in 2.9.2.2		Passed
003	Rx channel 1 malfunction	Check documentation		N/T
004	Rx channel 2 malfunction	Check documentation		N/T
005	Rx channel 70 malfunction	Check documentation		N/T
006	General AIS failure	Check documentation		N/T
008	MKD connection lost	Check is done in 2.9.2.5		Passed
025	External EPFS lost	Check is done in 2.9.3.1		Passed
029	No valid SOG information	Check is done in 2.9.3.3		Passed
030	No valid COG information	Check is done in 2.9.3.3		Passed
032	Heading lost/invalid	Check is done in 2.9.3.2		Passed
035	No valid ROT information	Check is done in 2.9.3.2		Passed

2009-04-03 Ba	Test details - Status display			
ID	Test item	Check	Remark	Result
007	UTC clock lost			Passed
021	External DGNSS in use	Check is done in 2.9.3.1		Passed
022	External GNSS in use	Check is done in 2.9.3.1		Passed
023	Internal DGNSS in use (beacon)	Check is done in 2.9.3.1		Passed
024	Internal DGNSS in use (msg 17)	Check is done in 2.9.3.1		Passed
025	internal GNSS in use	Check is done in 2.9.3.1		Passed
027	External SOG/COG in use	Check is done in 2.9.3.3		Passed
028	Internal SOG/COG in use	Check is done in 2.9.3.3		Passed
031	Heading valid	Check is done in 2.9.3.2		Passed
033	Rate of Turn indicator in use	Check is done in 2.9.3.2		Passed
034	Other ROT source in use	Check is done in 2.9.3.2		Passed
036	Channel management parameters changed	Check that status change is displayed if channel management parameters are changed.		Passed
	TXT request See note)	Check that the actual TXT sentences can be requested using the $xxAIQ,TXT sentence	There is no response on request for TXT. Retest 2009-07-03 Ba: The TXT sentences are output on query.	Passed

Note) This function is not explicitly required in the IEC 61993 standard but will be required in the next version of IEC 61993. An external display unit cannot handle the status display correctly without being able to request the actual status.

2.10.4 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

2008-05-29 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)		Passed
	Check that report rate is 10 s		Passed
• Disable GPS by disconnection of GPS antenna, • at least one other AIS transponder with UTC direct	Check that sync state is 1 (UTC indirect		Passed
	Check that report rate is 10 s		Passed
• GPS disabled • Remove other AIS	Check that sync state is 3 (no UTC source)		Passed
• GPS disabled, • One base station with UTC direct within range	Check that sync state is 1 (UTC indirect)		Passed
	Check that report rate is 10 s		Passed
• GPS disabled • Remove Base station	Check that sync state is 3 (no UTC source)		Passed

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.

2008-05-29 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 without GPS	Check that sync state is 3	UTC 09:08	Passed
• Other Transponders all without GPS, • Semaphore 1)	Check that report rate is 2 s		Passed

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

2008-05-29 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)		Passed
	Check that report rate is 10 s		Passed
• GPS disabled • Remove Base station	Check that sync state is 3 (no UTC source)		Passed
• Operate without GPS • Other Transponders all without GPS, • Not semaphore 1)	Check that sync state is 3		Passed
	Check that report rate is 10 s		Passed
• Enable GPS	Check that sync state is 0		Passed
• Other Transponders all without GPS,	Check that report rate is 10 s		Passed

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.

2008-04-16 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		Passed
Slot count	Check that Slot number does not exceed 2249		Passed
Slot length	Check that Slot length does not exceed 26,67 ms		Passed

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 .

2008-04-16 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)		Passed
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 majority of the sample are delayed about 100 µs to the sync source but within the limits. Some of the samples are delayed up to 700 µs and more and therefore outside the limits Retest 2008-05-27 Ba: Many samples are delayed by about 500 µs, some up to 1100 µs Retest 2009-01-14 Ba: Same problem. At the beginning there is an offset of up to 10 ms, later there are sometimes offsets of around 0.6 ms Retest 2009-06-24 Ba: The average value is correct but still there are sometimes offsets of around 0.5 ms and up to 1 ms Retest 2009-07-22 Ba: The sync jitter is within the limits.	Passed

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

2008-05-29 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		Passed
TX of BBM message Apply BBM sentence to the PI	Check that VDO output of PI is according to BBM sentence		Passed
	Check with VDL analyser that VDL message is according to BBM		Passed
	Check that VDM sentence of RX is according to VDO of TX		Passed

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.

2008-05-29 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)		Passed
Set CRC bit sequence to false	Check that position report is not received from EUT (VDO output)		Passed

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.

Record the VDL data of the first 12 frames after switching on the EUT, 3 frames for this test and 8 frames for test 4.6.2. Generate a table and diagram from that data and check the following test items using the recorded data.

2008-04-16 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		Passed
Initial message type	Check that the network entry is done with msg 3		Passed
Keep flag	Check that the keep flag is set in msg 3		Passed
Slot offsets	Check that the slot offsets of msg 3 are in the range 750 +/- 75= 675 ... 825		Passed
Slot use	Check that the allocated slots are used in the next frame		Passed
Message type	Check that the message type is changed to 1 after initial frame		Passed
Timeout	Check that the time-out in the 2nd frame is between 2 and 6 (decremented from initial 3..7)	Time-out is between 3 and 7 Retest 2008-05-26 Ba: The time-out is between 3 and 6	Passed

2008-05-29 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	The EUT first shedules a reporting interval of 10 s, when this is finished it reschedules for a reporting interval of 6 s. ***REC***: We recommend to schedule directly for the correct reporting interval. Retest 2009-07-03 Ba: UTC 12:48, 12:54 EUT starts transmission with the correct reporting interval. Remark: for 2 message 3 there is no VDO output. It seems to depend on problems with the VSWR.	Passed
Slot offsets	Check that the slot offsets of msg 3 are in the range 450 +/- 45 = 405....495	For the rescheduling	Passed
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	The EUT first shedules a reporting interval of 10 s, when this is finished it reschedules for a reporting interval of 2 s. ***REC***: We recommend to schedule directly for the correct reporting interval. Retest 2009-07-03 Ba: UTC 13:01 EUT starts transmission with the correct reporting interval - There are 8 VDOs without real transmission. - There is the same problem with VSWR and missing VDOs Retest 2009-07-22 Ba: There are no additional VDOs and no other problems (UTC 08:56)	Passed Passed
Slot offsets	Check that the slot offsets of msg 3 are in the range 150 +/- 15 = 135...165	For the rescheduling	Passed

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.

2008-04-16 Ba	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		Passed
Nominal increment and selection interval	Check that the allocated slots match the nominal and selection interval of 10 s reporting rate		Passed
Slot interval	Check that the slot intervals are in the range 375 +/- 75 = 300 ... 450		Passed
Timeout	Check that the time-out is counting from 3...7 to 0		Passed
Slots used	Check that the slots indicated in CommState match the slots used		Passed
Slots allocated at time-out 0	Check that the slots are used in the next frame		Passed
	Check the slot offset is 2250 +/- Selection Interval (2175...2325)		Passed

CommState sub message	Check that for time-out 3,5,7 the number of received stations is indicated		Passed
	Check that for time-out 2,4,6 the slot number is indicated	• Normally the correct slot number is indicated • Sometimes with time-out 4 there is an incorrect, different number (marked yellow in the diagrams) Retest 2008-05-26 Ba: Slot number is ok	Passed
	Check that for time-out 1 the correct value of UTC is indicated		Passed
	Check that for time-out 0 the slot increment is indicated		Passed
Alternating channels	Check that the position reports are transmitted on alternating channels		Passed
Msg 5	Check that the channel alternating of position report is not impaired by msg 5		Passed
Others	Check the recorded data for other possibly incorrect items	After a few frames (1...10) the transmission slots of a complete frame are shifted by 1 slot (sometimes by 2 or 3 slots) down for the complete frame, e.g. transmission in slot 1000 changes to 999, continuing to the next slot shift. Retest 2008-05-26 Ba: There is no slot shift	Passed

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 %.

2009-01-21 Ba	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		Passed
Message type	Check that msg 3 is used		Passed
Slot interval	Check that the slot intervals are 3 min +/- 20 %		Passed
Start of 3 min interval	Check that the slots of the first transmissions are allocated	• The first transmission on channel B is allocated. • The first transmission on channel A is not allocated <u>Retest 2009-03-31 Ba:</u> The first transmissions on channel A and B are allocated	Passed
Slot increment	Check that the slot increment = 13500 +/- 40 %		Passed
Number of slots	Check that the number of slots = 1 (value in comm state = 5)		Passed
Keep flag	Check that the keep flag = 0		Passed
Alternating channels	Check that the position reports are transmitted on alternating channels		Passed
Other failures	<u>Retest 2009-03-31 Ba:</u> The first position report which is used to allocate a msg 3 is repeated once more in the next frame. The keep flag of msg 3 is set to 0 (ok), so the slots are released, and there should not be a further transmission in the next frame Remark: There is a similar transmission at the end of an assignment at 3 min reporting rate (Test 14.4.3). <u>Retest 2009-06-24 Ba:</u> The transition from 10 s to 3 min reporting interval is correct.		Passed

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.

2008-05-29 Ba	Test details – RATDMA transmission		
Test item	Check	Remark	Result
Apply an binary broadcast message 8 to the PI port of the EUT. File name is: AIBBM_bin.sst			
Standard test environment	Check that msg 8 is transmitted within 4 s		Passed
90 % channel load Generate channel load as described below 1).	Check that msg 8 is transmitted within 4 s	Test 2009-01-20 Ba The Tx delay is 1,3,3,0,1,3 s	Passed

2008-05-29 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		Passed
	Check that RATDMA is used if there is no position report within 4 s	Test 2009-01-20 Ba:	Passed
	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**	Test 2009-01-20 Ba:	Passed
90 % channel load Generate channel load as described below 1).	Check that msg 8 is transmitted within 4 s		Passed
	Check that RATDMA is used if there is no position report within 4 s	Test 2009-01-20 Ba:	Passed
	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**	Test 2009-01-20 Ba:	Passed

2008-05-29 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		Passed
ABK output	Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.		Passed

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.

2009-01-21 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		Passed
Message type for allocation	Check that the last msg 1 before msg 5 is changed to msg 3	It seems that msg 5 is allocated only if there is a message 1 short time (4 s?) before the scheduled transmission of message 5. See Note) Retest 2009-03-31 Ba: The first 2 position reports in the previous frame are used to allocate the slots for msg 5. Remark: If all position reports in the previous frame have time-out 0 the slots for msg 5 are not allocated	Passed
Number of slots	Check that the number of slots = 2		Passed
Keep flag	Check that the keep flag = 1		Passed
Slot allocation	Check that the slot allocated by msg 3 is used for Tx of msg 5		Passed
Alternating channels	Check that the msg 5 are transmitted on alternating channels		Passed

Note)
There is no problem to allocate the slots for message 5 more than 4 s before the transmission. It should be within 1 minute before the transmission because of the timing of a network entry.

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.

2008-05-29 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	Retest 2009-04-01 Ba: At assignment time-out there is one unallocated message 3. One of the existing position reports (e.g. the report in slot 286) should be used. Retest 2009-06-24 Ba: The transmissions in one SI of the old reporting rate continues, nearly at the same time as a SI of the new reporting interval Retest 2009-07-22 Ba: No change, there is still the same problem Retest 2009-08-27 Ba: The reporting schedule is correct	Passed
Offset value = 1000 (> 600 msg/10 min	Check that the reporting rate is 600/10min = 60/min = 1s		Passed
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	Retest 2009-04-01 Ba: There are transmissions with reporting rate 1 s only on channel A. On channel B there is only 1 transmission per frame Retest 2009-06-24 Ba: The rescheduling for the 1 s reporting interval is correct.	Passed

	With the assigned reporting rates of 1s and 5 s there are additional messages, see diagrams Retest 2008-09-30 Ba: • There are still additional messages at 1s and 5 s reporting rate • In the test there is a slot shift by –1 at the beginning of the assigned mode and 2 min after the assignment Retest 2009-01-15 Ba: • There are still additional messages at 1s and 5 s reporting rate • In the test there was no slot shift • In the first test with rate assignment 1000 test there was no transmission at the end of assigned mode for 1 frame. During this periode there was a Tx malfunction alarm and no VDO output (with channel) • In a second test there was no transmission for 1 frame, starting short time before the end of the first assignment frame. In this case there was no Tx malfunction alarm but output of VDO with channel for all scheduled transmissions. The message were not received and there were no SWR output sentences for these VDOs, so it seems they were allocated but not transmitted. Retest 2009-04-01 Ba: The above problems are solved		Passed

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).

2008-05-27 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		Passed
First message	Check that first message is sent after 40 slots		Passed
Message type	Check that message type of position report is 2		Passed
Initialisation phase	Check that EUT starts immediately (after offset slots) with message 2		Passed
Deallocation of previously used slots	Check that the slot used before assignment are deallocated using timeout value = 0 and slot offset = 0		Passed
Alternating channels	Check that position report is sent alternating on channel A and B		Passed
Increment	Check that the increment is 125 slots		Passed
Timeout	Check that all slots of the first msg2 frame have the same timeout		Passed
	Check that the timeout is between 3 and 7	Time-out in the test = 3	Passed
	Check that the timeout is decremented after 1 min		Passed
Comstate	Check that the ComState is like the ComState of msg 1		Passed
Switch back to autonomous mode	Check that the EUT deallocates all msg 2 slots with timeout 0		Passed
	Check that the EUT changes slots with timeout 0 on each channel to ITDMA slot msg 3 to start autonomous mode		Passed
	Check that EUT initialises autonomous mode like network entry		Passed

2008-05-27 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		Passed
Initialisation phase	Check that EUT starts immediately with rescheduling to the new reporting rate		Passed
Message type	Check that message type of position report is 2 instead of msg 1		Passed
Reporting rate	Check that the reporting is 300 msg/10 min = 30msg/frame = 2 s		Passed
Alternating channels	Check that position report is sent alternating on channel A and B		Passed
Initialisation	Check that the Initialisation is according to changing reporting rate using msg 3 to allocate new slots		Passed
Timeout	Check that the assigned timeout is between 2 and 6	The time-out value in the next frame is between 3 and 7 Retest 2008-09-30 Ba: No change, the time-out value is in the range of 3 to 7 Retest 2009-01-15 Ba: No change, the time-out value is in the range of 3 to 7 Retest 2009-04-01 Ba: The values are in the range of 3 to 6.	Passed
Assignment repetition	Check that the timeout is extended by repetition of msg 16: Switch back is between 3 and 7 minutes after last repetition		Passed
Switch back to autonomous mode	Check that the EUT reverts to normal reporting rate between 4 and 8 minutes after last msg 16		Passed

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.

2008-05-29 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		Passed
Wrong MMSI	Check that the EUT does not change the reporting rate		Passed

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.

2008-05-29 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 13:57	Passed
Slot use	Check that slots assigned by the msg 16 are used by the EUT	UTC 13:58	Passed

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.

2008-05-29 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	UTC 12:07 ... 12:27 Remark: In the frame after the first msg 20 all position reports using reserved slots are forced to time-out 0 and reselect free slots Retest 2009-08-28 Ba:	Passed Passed
End of reservation	Check that after end of reservation all slots are used again.	Retest 2009-08-28 Ba:	Passed
Other channel	Check that the reserved slots are also not used on the other channel because of priority rules See note)	Remark: Different to the channel with reservations the time-out is not forced to 0. The position reports using slots with reservation on the other channel are at the next regular time-out 0 reselected to slots which are free on the other channel Retest 2009-08-28 Ba:	Passed Passed
Repeat test without message 4	Check that all slots are used	Test 2009-08-28 Ba:	Passed
Repeat test with base station, distance > 120 NM	Check that all slots are used		

General	For about one minute there are no transmissions (UTC 12:09 and 12:10). The PI log shows VDO outputs with channel during this phase. Normally after a transmission there is an $PSAEAISSWR sentence which shows the SWR of the transmission. After the VDOs of the missing transmissions there is no $PSAEAISSWR sentence output which indicates that there is not really a transmission Retest 2008-09-30 Ba: • No change, again there is a minute (again after tx of message 5) without transmissions. VDO outputs show the same, VDO with channel but without SWR sentence. • In frame 10:40 (2 min before slot reservation) there are 2 unexpected message 3 (one on each channel) Retest 2009-01-15 Ba: There are no breaks in transmission and no unexpected messages	Passed
	• In frame UTC 12:20 there is a slot shift of all transmissions to one slot earlier (e.g. from slot 101 to slot 100 in the next frames). • This results in a shift of all transmissions in slot xxx0 (free slot) to slot xxx9 (reserved slots). Retest 2008-09-30 Ba: In this test there is no slot shift (but in other tests there still is a slot shift)	Passed

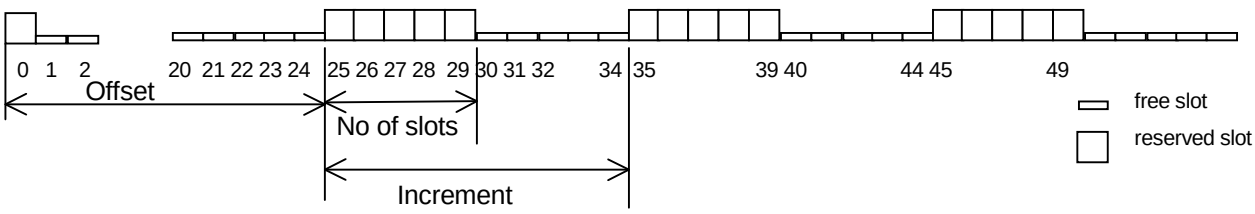
Note) According to ITU-R M1371, §4.4.1 and clarification 2.56 a slot reserved by a base station on the other channel has got the lowest possible priority, that means it can be used for candidate slots, but only if no other slot with higher priority is available.

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 16.6.6 Group assignment

(6.1.3, 7.3.3.1, M.1371/A8-3.12, A8-3.19, A2-3.3.6)

This test item is taken from the Inland AIS standard and modified for class A

4.6.7.1 16.6.6.1 Assignment priority

4.6.7.1.1 16.6.6.1.1 Assignment by message 22

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command (message 23) to the EUT with TX/RX mode 1.

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 TX/RX mode 2

b) Transmit a message 23 to the EUT with TX/RX mode 1 within 10 minutes after test a)

c) Repeat transmission of message 23) to the EUT with TX/RX mode 1 after 15 minutes.

d) Repeat the test, clear the region defined by message 22 under a)[3]. Transmit message 22 to the EUT with regional settings specifying TX/RX mode 2

Record transmitted messages.

Required results

a) The Tx/Rx mode field setting of message 22 shall take precedence over the Tx/Rx mode field setting of message 23.

b) Verify that the EUT ignores the assignment by message 23 and the setting of message 22 takes precedence for 10 minutes.

c) Verify that the EUT applies the Tx/Rx mode field setting of message 23

d) The Tx/Rx mode field setting of message 23 shall take precedence over the Tx/Rx mode field setting of message 22. The receiving station shall revert to its previous Tx/Rx mode after a timeout value randomly chosen between 240 sec and 480 sec.

[3] This can be carried out by assigning a new simulated position to the EUT.

2009-06-24 Ba	Test details - Assignment by msg 22		
Test item	Check	Remark	Result
The test sequence is modified to improve testability (Test d before a..c) Setup EUT in autonomous mode Prepare message 23 such that the EUT is addressed by group assignment command. Set Tx/Rx mode to 1. Prepare message 22, EUT inside area, Tx/Rx mode = 0			
Transmit message 23	Verify that message 23 is received and content is correct.		Passed
Reporting rate	Check that reporting rate is as expected by message 23.		Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 23 (Tx on channel A).		Passed
d) Msg 22 to an area			
Transmit message 22 (Tx/Rx mode = 0)	Verify that message 22 is received (ACA output)		Passed
Tx/Rx mode	Check Tx/Rx mode = 1 (Tx on channel A) according to msg 23		Passed
Wait for time-out of msg23			
Reporting rate	Check that reporting rate = autonomous reporting rate		Passed
Tx/Rx mode	Check Tx/Rx mode = mode of msg 22 = 0 (Tx on channel A and B)		Passed
Msg 22 individually addressed			
Transmit message 23 (Tx/Rx mode = 1)	Verify that message 23 is received and content is correct.		Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 23 (Tx on channel A).		Passed
a) Transmit message 22 individually addressed (MMSI) (Tx/Rx mode = 2)	Verify that message 22 is received and content is correct.		Passed
Tx/Rx mode	Check Tx/Rx mode = mode of msg 22 = 2 (Tx on channel B)		Passed

b) Transmit message 23 with Tx/Rx mode 1 within 10 min after msg 22	Verify that message 23 is received and content is correct.		Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 22 (Tx on channel B).	• For the first 6 min after message 22 (or 8 min after msg 23) the EUT reports correctly on channel 2 • Then it reports on channel A and B Retest 2009-07-22 Ba: No change, same behaviour as before Retest 2009-08-27 Ba: Same problem, 8 min after the msg 23 the EUT reverts to Tx/Rx mode 0. This is incorrect because the Tx/Rx mode of the actual area is uns is 2 as defined by message 22 Retest 2009-09-10 Ba: The Tx/Rx mode remains 2 as defined in message 22	Passed OK
c) Transmit message 23 with Tx/Rx mode 1 at 15 min min after msg 22	Verify that message 23 is received and content is correct.		Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 23 (Tx on channel A).	11 min after message 22 the EUT accepts the Tx/Rx mode of message 23.	Passed

4.6.7.1.2 16.6.6.1.3 Assignment by message 16

Messages which are addressed directly to an AIS Transponder have precedence of group assignment commands and manual assignments. Following test should verify the assignment priority of these messages.

Method of measurement

Set up the standard test environment and operate EUT in autonomous mode. Input sensor data to achieve a reporting interval of 10 sec.

a) Address the EUT with an AIS message 16 to bring the EUT in assigned mode with a reporting interval of 5 seconds. Record VDL and verify the reaction of the EUT.

b) Apply a message 23 with a reporting interval of 2 seconds. Construct message 23 in that way that the EUT will be addressed by the message.

Required results

a) Verify that the reporting interval is 5 s.

b) Verify that the EUT ignores the command given by message 23.

2009-06-24 Ba	Test details - a, b		
Test item	Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Input sensor data to achieve a reporting interval of 10 sec.			
Apply sensor data	Check that EUT operates in autonomous mode and transmits position reports with autonomous reporting rate.		Passed
Transmit message 16 (reporting rate 5 seconds, Offset = 120)	Monitor VDL and presentation interface and verify that message 16 is received and content is correct.		Passed
Assigned mode	Check that msg type of position reports = 2		Passed
Reporting rate	Check that reporting rate is 5 seconds.		Passed
Transmit message 23 with reporting interval = 2 s	Monitor VDL and presentation interface and verify that message 23 is received and content is correct.		Passed
Assigned mode	Verify that the EUT ignores the command given by message 23 (reporting interval = 5s)		Passed

4.6.7.2 16.6.6.2 Increased reporting interval assignment

4.6.7.2.1 16.6.6.2.1 Increased reporting interval assignment by message 23

(7.3.3.1, M.1371/A2-3.3.6)

Method of measurement

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

a) Transmit a Group Assignment message (message 23) to the EUT with a reporting interval greater than the autonomous reporting interval.

b) Transmit a Group Assignment message (message 23) to the EUT with a quiet time command.

Record transmitted messages.

Required results

Confirm that the EUT transmits position reports with the autonomous reporting interval in both a) and b).

2009-06-24 Ba	Test details - Increased reporting interval		
Test item	Check	Remark	Result
Reporting rate	Check VDO output and verify that RR is as given by autonomous mode (10 sec)		Passed
Transmit msg23 (reporting interval > 10 s)	Verify that EUT receives the msg	UTC 14:24	Passed
Report rate	Check that transponder declines msg 23 command		Passed
Transmit msg23 with quite time	Verify that EUT receives the msg		Passed
Report rate	Check that transponder declines msg 23 command		Passed

4.6.7.3 16.6.6.3 Entering interval assignment

4.6.7.3.1 16.6.6.3.1 Entering interval assignment

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 seconds..

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 next shorter.

d) Operate EUT in autonomous mode with a reporting interval of 6 seconds. Transmit a Group Assignment command (message 23) to the EUT with a reporting interval next shorter.

Monitor the VDL.

Required results

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

b) Verify that EUT enters assigned operation mode and transmits position report message 2 with 2 seconds reporting interval.

c) Verify that EUT enters assigned operation mode and transmits position report message 2 with 5 seconds reporting interval.

d) Verify that EUT enters assigned operation mode and transmits position report message 2 with 2 seconds reporting interval.

2009-04-03 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 msg 23		Passed
Initialisation phase	Check that EUT starts immediately with rescheduling to the new reporting rate		Passed
Slot deallocation	Check that the slot of the autonomous reporting interval are released using time-out = 0 and slot offset = 0		Passed

Initialisation / Slot allocation	Check that the slot of the assigned reporting interval (5s) are allocated according to the network entry procedure	Generally the entry procedure of the new reporting rate is correct. The slot allocation on channel B is started with an unallocated msg 3. The use of unallocated message should be avoided as far as possible. In this case the next message on channel B (in slot 752) could be used to allocate the slot for the first msg 3 (in slot 936). Retest 2009-06-24 Ba: The EUT still uses an unallocated slot for the start of the rescheduling This seems to be acceptable to start the scheduling on the other channel in the next NI.	Passed Passed
Message type	Check that message type of position report is 2 instead of msg 1	The message type is 1 Retest 2009-06-24 Ba: Message type = 2	 Passed
Reporting rate	Check that the reporting interval = 5 s		Passed
Alternating channels	Check that position report is sent alternating on channel A and B		Passed
Slot deallocation	Check that the slot of the assigned reporting interval are released using time-out = 0 and slot offset = 0	Tests 2009-06-24 Ba:	Passed
Initialisation / Slot allocation	Check that the slot of the autonomous reporting interval (10s) are allocated according to the network entry procedure	Tests 2009-06-24 Ba:	Passed
Timeout	Check that the assigned timeout is between 2 and 6	There is no time-out. The assigned mode is continuing unlimited Retest 2009-06-24 Ba: The time-out is 6 min after the last message 23	 Passed

b) Send a group assignment message 23 with a reporting interval of 2 s (value 11)			
VDM output	Check VDM output of msg 23	Tests 2009-06-24 Ba: UTC 14:31	Passed
Message type	Check that message type of position report is 2	Message type = 1, Message 23 is ignored Retest 2009-07-22 Ba: Message 23 is accepted (UTC 10:21)	Passed
Reporting rate	Check that the reporting interval = 2 s	Reporting interval = 10s Retest 2009-07-22 Ba: The reporting interval is 2 s	Passed
c) Send a group assignment message 23 with reporting interval = next shorter interval (value 9)			
VDM output	Check VDM output of msg 23	Tests 2009-06-24 Ba: UTC 14:37	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval = 5 s	The reporting interval is 2 s See note) Retest 2009-07-22 Ba: The reporting interval is 5 s (UTC 10:33)	Passed
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 msg 23	Tests 2009-06-24 Ba: Tested with value 10 (according to ITU-R M.1371-3)	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval = 2 s	The reporting interval is 5 s. Remark: 5s and 6 s reporting interval are handled as the same step of intervals. Therefore the next shorter interval is 2 s. Retest 2009-07-22 Ba: The reporting interval is 2 s (UTC 10:53)	Passed

Note)
The reporting interval settings of ITU-R M.1371 have been changed in the “IALA technical clarifications on Recommendation ITU-R M.1371-3”, Ed. 2.0.

Reason for the change is the compatiblity to the existing AIS class B equipment

4.6.7.3.2 16.6.6.3.2 Addressing by geographic region

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 seconds.

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 seconds 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 seconds and apply message to VDL.

Required result

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

b) Verify that EUT declines message 23.

2009-06-24 Ba	Test details - a)		
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 seconds (SOG).			
Transmit message 23, EUT inside region (Reporting interval value = 8)	Check that msg 23 is received (VDM output)		Passed
Reporting rate	Check that the reporting interval is changed to 5 s		Passed
Message 23 timeout	Verify that EUT reverts to normal operation mode after 4... 8 min		Passed

2009-06-24 Ba	Test details - b)		
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 seconds (SOG).			
Transmit message 23, EUT outside region (Reporting interval = 2 s)	Verify that EUT declines message 23	UTC 14:53	Passed

4.6.7.3.3 16.6.6.3.3 Addressing by station type.

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 seconds.

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 seconds and the station type to 0 (all stations).

b) Transmit a Group Assignment command (message23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 seconds and the station type to 4 (A to N).

c) Transmit a Group Assignment command (message23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 5 seconds and the station type to 6 (Inland Waterway). Apply this message to the VDL again within 4 minutes. Record VDL and check reaction of the EUT.

Required result

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

b) Verify that EUT declines message 23.

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

2009-06-24 Ba	Test details - a)		
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 seconds (SOG).			
Transmit message 23 EUT inside area, station type = 0, Reporting interval = 5 s	Check that msg 23 is received (VDM output)		Passed
Reporting rate	Check that the reporting interval is changed to 5 s		Passed
Message 23 timeout	Verify that EUT reverts to normal operation mode after 4... 8 min		Passed

2009-06-24 Ba	Test details - b)		
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 seconds (SOG).			
Transmit message 23 EUT inside area, station type = 4 (AtoN), Reporting interval = 5 s	Check that msg 23 has been received (VDM output)	UTC 14:56 Tested with station types 2, 3, 4, 5, 6	Passed
Reporting rate	Check that EUT transmit position reports with autonomous reporting interval..		Passed

2009-06-24 Ba	Test details - c)		
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 seconds (SOG).			
Transmit message 23 EUT inside area, station type = 1 (Class A station only), Reporting interval = 5 s (8)	Check that msg 23 has been received (VDM output	Remark: This value is defined in the “IALA technical clarifications on Recommendation ITU-R M.1371-3”, Ed. 2.0 UTC 15:00	Passed
Reporting rate	Check that the reporting interval is changed to 5 s		Passed
Repeat message 23 within 4 minutes	Check that reporting interval of 5 s is maintained		Passed
Stop repetition of msg 23	Verify that EUT reverts to normal operation mode at 4... 8 min after the last msg 23		Passed

4.6.7.3.4 16.6.6.3.4 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 seconds.

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 seconds 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 seconds and the ship and cargo value to a desired value. Make sure that a different value is configured in the EUT.

Required result

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

b) Verify that EUT declines message 23.

2009-06-24 Ba	Test details - a)		
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 seconds (SOG). Set EUT to ship and cargo type = 72			
Transmit message 23 EUT inside area, station type = 0 Reporting interval = 5 s Cargo type = 70	Check that msg 23 is received (VDM output)	UTC 15:16 VDM output	Passed
Reporting rate	Check that the reporting interval is changed to 5 s	Interval = 10 s Message 23 is ignored x0 (x=2,4,6,7,8,9) means: All ships of this type. Therefore the EUT should be addressed by this value. Retest 2009-07-22 Ba: Message 23 is accepted, the reporting interval is 5 s	Passed
Transmit message 23 EUT inside area, station type = 0 Reporting interval = 5 s Cargo type = 72	Check that msg 23 is received (VDM output)	UTC 15:18	Passed
Reporting rate	Check that the reporting interval is changed to 5 s		Passed

2009-06-24 Ba	Test details - b)		
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 seconds (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 msg 23 has been received (VDM output)		Passed
Reporting rate	Check that EUT transmit position reports with autonomous reporting interval..		Passed

4.6.7.3.5 16.6.6.3.5 Ships not under way (NavStat 1 or 5)

Method of measurement

Set up standard test environment and operate EUT with navigational status not under way (NavStat 1 or 5) and not moving (autonomous mode with a reporting interval of 3 minutes.)

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 seconds 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 inside this region). Set the TX/RX mode to mode 2 and apply message to VDL.

Set up standard test environment and operate EUT with navigational status not under way (NavStat 1 or 5) and moving faster than 3 knots (autonomous mode with a reporting interval of 10 seconds.)

c) 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 seconds and apply message to VDL.

Required result

a) Confirm that the EUT transmits position reports with the autonomous reporting interval.

b) Confirm that the EUT switches to TX/RX mode 2 and reverts to normal operation mode after timeout period.

c) Confirm that the EUT transmits position reports with the assigned reporting interval (2 seconds).

2009-06-25 Ba	Test details - a, b, c)		
Test item	Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode with a reporting rate of 3 min (Nav status 1 or 5 and SOG < 3 kn.			
a) Transmit message 23 with reporting interval = 5 s	Monitor VDL and presentation interface and verify that message 23 is received and content is correct.	UTC 14:47	Passed
Assigned mode	Check that msg type remains 3 and is not changed to 2		Passed
Reporting rate	Check that reporting rate remains at 3 min		Passed
b) Transmit message 23 with Tx/Rx mode = 2	Monitor VDL and presentation interface and verify that message 23 is received and content is correct.	UTC 15:00	Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 23 (Tx on channel B).	The EUT transmits message 3 alternating on channel A and B Retest 2009-07-22 Ba: The EUT transmits on channel B only	Passed
Time-out	Verify that the EUT reverts to normal operation mode after timeout period.	Retest 2009-07-22 Ba: The EUT reverts to TX/Rx mode 0 after time-out	Passed
Set SOG to a value > 3 kn			
c) Transmit message 23 with reporting interval = 5 s	Monitor VDL and presentation interface and verify that message 23 is received and content is correct.	UTC 15:08	Passed
Assigned mode	Check that msg type is changed to 2		Passed
Reporting rate	Check that reporting interval is set to 5 s according to the interval of message 23		Passed

4.6.7.4 16.6.6.4 Reverting from interval assignment

Method of measurement

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

Verify that EUT enters autonomous operation mode after a time-out of 4 to 8 minutes and transmits position report message 1 with autonomous derived reporting interval.

Verify that EUT build up the assigned transmission scheduled according to network entry procedure. Verify that unused slots of the previous reporting schedule are released.

2009-06-24 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 RR is 10 seconds (SOG).			
Transmit message 23 EUT inside area, station type = 0 Reporting interval = 5 s	Check that msg 23 has been received. Record Rx time		Passed
Reporting rate	Check that EUT transmit position reports with reporting interval of 5 seconds.		Passed
Time-out	Check that the EUT reverts to 10 s reporting rate after 4.. 8 min		Passed
Slot deallocation	Check that the slot of the assigned reporting interval are released using time-out = 0 and slot offset = 0		Passed
Slot allocation	Check that the slot of the autonomous reporting interval (10s) are allocated according to the network entry procedure		Passed

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.

2008-06-02 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		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
Repeat indicator	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
Navigational status	Check the field content		Passed
Rate of Turn	Check the field content		Passed
SOG	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
COG	Check the field content		Passed
True heading	Check the field content		Passed
Time stamp	Check the field content		Passed
RAIM flag	Check the field content		Passed
Communication state	Check the field content		
	The communication state is checked in 4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)		

2008-06-02 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		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
UTC year, month, day, hour, minute, second	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
Type of EPFD	Check the field content		Passed
RAIM flag	Check the field content		Passed
Communication state	Check the field content		
	The communication state is checked in 4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)		

2008-06-02 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		Passed
Check sentence number	Check that value = 1,2		Passed
Sequential message ident.	Check that counting from 0...9 modulo 10		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Message ID	Check the field content		Passed
MMSI	Check the field content		Passed
AIS version indicator	Check the field content		Passed
IMO number	Check the field content		Passed
Call sign	Check the field content		Passed
Name of ship	Check the field content		Passed
Type of ship and cargo type	Check the field content		Passed
Reference point A,B,C,D	Check the field content		Passed
Type of EPFS	Check the field content		Passed
ETA	Check the field content		Passed
Maximum present static draught	Check the field content		Passed
Destination	Check the field content		Passed
DTE flag	Check the field content		Passed

2008-06-02 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		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (msg length = 112 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Sequence number	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed
Retransmit flag	Check the field content		Passed
DAC	Check the field content		Passed
FI	Check the field content		Passed
Binary data	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 7 Binary acknowledge		
Test item	Check	Remark	Result
Transmit a message 7 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID 1 (MMSI)	Check the field content		Passed
Sequence number 1	Check the field content		Passed
Destination ID 2 (MMSI)	Check the field content		Passed
Sequence number 2	Check the field content		Passed
Destination ID 3 (MMSI)	Check the field content		Passed
Sequence number 3	Check the field content		Passed
Destination ID 4 (MMSI)	Check the field content		Passed
Sequence number 4	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 8 Binary broadcast message		
Test item	Check	Remark	Result
Transmit a message 8 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		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 4 (msg length = 80 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
DAC	Check the field content		Passed
FI	Check the field content		Passed
Binary data	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 9 SAR aircraft position report		
Test item	Check	Remark	Result
Transmit a message 9 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
Repeat indicator	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
Altitude	Check the field content		Passed
SOG	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
COG	Check the field content		Passed
Time stamp	Check the field content		Passed
DTE flag	Check the field content		Passed
RAIM flag	Check the field content		Passed
Communication state			
Sync state	Check the field content		Passed
Slot time-out	Check the field content		Passed
Submessage: received stations	Check the field content		Passed
Submessage: Slot number	Check the field content		Passed
Submessage: UTC	Check the field content		Passed
Submessage: Slot offset	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 10 UTC and data inquiry		
Test item	Check	Remark	Result
Transmit a message 10 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID 1 (MMSI)	Check the field content		Passed
			Passed
Msg11 response	Check for response with msg 11 if EUT is addressed		Passed
Msg11 response	No response if addressed to other station		Passed

2008-06-02 Ba	Test details – Content of msg 11 UTC date response		
Test item	Check	Remark	Result
Transmit a msg 11 from VDL generator Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
UTC year, month, day, hour, minute, second	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
Type of EPFD	Check the field content		Passed
RAIM flag	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 12 Addressed safety related message		
Test item	Check	Remark	Result
Transmit a message 12 from other AIS transponder or VDL generator addressed to EUT. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 138 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Sequence number	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed
Retransmit flag	Check the field content		Passed
Safety related text	Check the field content		Passed
Transmit a message 12 from other AIS transponder or VDL generator addressed to other AIS. Message shall not be on PI.			
Msg12 to other AIS	Check PI , no VDM		Passed

2008-06-02 Ba	Test details – Content of msg 13 Safety related acknowledge		
Test item	Check	Remark	Result
Transmit a message 13 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID 1 (MMSI)	Check the field content		Passed
Sequence number 1	Check the field content		Passed
Destination ID 2 (MMSI)	Check the field content		Passed
Sequence number 2	Check the field content		Passed
Destination ID 3 (MMSI)	Check the field content		Passed
Sequence number 3	Check the field content		Passed
Destination ID 4 (MMSI)	Check the field content		Passed
Sequence number 4	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 14 Safety related broadcast message		
Test item	Check	Remark	Result
Transmit a message 8 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		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (length = 144 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Safety related text	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 15 Interrogation		
Test item	Check	Remark	Result
Transmit a message 15 from other AIS transponder or VDL generator . Response on this msg is tested under 6.3 18.2 (M.1371 A1/5.3) Interrogation responses			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID 1 (MMSI)	Check the field content		Passed
Message ID 1.1	Check the field content		Passed
Slot offset 1.1	Check the field content		Passed
Message ID 1.2	Check the field content		Passed
Slot offset 1.2	Check the field content		Passed
Destination ID 2 (MMSI)	Check the field content		Passed
Message ID 2.1	Check the field content		Passed
Slot offset 2.1	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 16 Assigned mode command		
Test item	Check	Remark	Result
Transmit a message 16 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 96 bit (1 dest.)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID A (MMSI)	Check the field content		Passed
Offset A	Check the field content		Passed
Increment A	Check the field content		Passed
Destination ID B (MMSI)	Check the field content		Passed
Offset B	Check the field content		Passed
Increment B	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 17 GNSS binary broadcast message		
Test item	Check	Remark	Result
Transmit a msg 17 from VDL generator Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 192 bit)		Passed
Message id	Passed		Passed
Source ID (MMSI)	Passed		Passed
Longitude	Passed		Passed
Latitude	Passed		Passed
Message type	Passed		Passed
Station Id	Check the field content		Passed
Zcount	Check the field content		Passed
Sequence number	Check the field content		Passed
N	Check the field content		Passed
Health	Check the field content		Passed
Correction data	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 18 Standard Class B position report		
Test item	Check	Remark	Result
Transmit a msg 18 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
SOG	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
COG	Check the field content		Passed
True Heading	Check the field content		Passed
Time stamp	Check the field content		Passed
Assigned mode flag	Check the field content		Passed
RAIM flag	Check the field content		Passed
CommState selector	Check the field content		Passed
Communication state - Selector = 0 (SOTDMA)			
Sync state	Check the field content		Passed
Slot time-out	Check the field content		Passed
Submessage: received stations	Check the field content		Passed
Submessage: Slot number	Check the field content		Passed
Submessage: UTC	Check the field content		Passed
Submessage: Slot offset	Check the field content		Passed
Communication state - Selector = 1 (ITDMA)			
Sync state	Check the field content		Passed
Slot increment	Check the field content		Passed
Number of slots	Check the field content		Passed
Keep flag	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 19 Extended Class B position report		
Test item	Check	Remark	Result
Transmit a msg 19 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
SOG	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
COG	Check the field content		Passed
True Heading	Check the field content		Passed
Time stamp	Check the field content		Passed
Name of ship	Check the field content		Passed
Type of ship and cargo	Check the field content		Passed
Dimension of ship/Refpoint A,B,C,D	Check the field content		Passed
Type of EPFD	Check the field content		Passed
RAIM flag	Check the field content		Passed
DTE flag	Check the field content		Passed
Assigned mode flag	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 20 Data link management message		
Test item	Check	Remark	Result
Transmit a message 20 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (msg length = 160 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Offset number 1	Check the field content		Passed
Number of slots 1	Check the field content		Passed
Time-out 1	Check the field content		Passed
Increment 1	Check the field content		Passed
Offset number 2	Check the field content		Passed
Number of slots 2	Check the field content		Passed
Time-out 2	Check the field content		Passed
Increment 2	Check the field content		Passed
Offset number 3	Check the field content		Passed
Number of slots 3	Check the field content		Passed
Time-out 3	Check the field content		Passed
Increment 3	Check the field content		Passed
Offset number 4	Check the field content		Passed
Number of slots 4	Check the field content		Passed
Time-out 4	Check the field content		Passed
Increment 4	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 21 ATON report		
Test item	Check	Remark	Result
Transmit a msg 21 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
Type of aids to navigation	Check the field content		Passed
Name of aids to navigation	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
Dimension of ship/Refpoint A,B,C,D	Check the field content		Passed
Type of EPFD	Check the field content		Passed
Time stamp	Check the field content		Passed
Off position indicator	Check the field content		Passed
RAIM flag	Check the field content		Passed
Virtual/Pseudo AtoN flag	Check the field content		Passed
Assigned mode flag	Check the field content		Passed
Name of AtoN extension	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 22 Channel management		
Test item	Check	Remark	Result
Transmit a msg 22 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
Channel A	Check the field content		Passed
Channel B	Check the field content		Passed
Tx/Rx mode	Check the field content		Passed
Power flag	Check the field content		Passed
Area addressed			
Longitude of NE corner	Check the field content		Passed
Latitude of NE corner	Check the field content		Passed
Longitude of SW corner	Check the field content		Passed
Latitude of SW corner	Check the field content		Passed
Addressed or broadcast flag	Check that flag = 0		Passed
Selective addressed			
Station ID 1 (MMSI)	Check the field content		Passed
Station ID 2 (MMSI)	Check the field content		Passed
Addressed or broadcast flag	Check that flag = 1		Passed
Channel A bandwidth	Check the field content		Passed
Channel B bandwidth	Check the field content		Passed
Transitional zone	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 23 Group assignment command		
Test item	Check	Remark	Result
Transmit a msg 23 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
Longitude of NE corner	Check the field content		Passed
Latitude of NE corner	Check the field content		Passed
Longitude of SW corner	Check the field content		Passed
Latitude of SW corner	Check the field content		Passed
Station type	Check the field content		Passed
Type of ship and cargo	Check the field content		Passed
Tx/Rx mode	Check the field content		Passed
Reporting interval	Check the field content		Passed
Quiet Time	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 24 A Class B CS static data report		
Test item	Check	Remark	Result
Transmit a msg 23 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Part Number	Check that part number = 0		Passed
Name	Check the field content		Passed

2008-06-02 Ba	Test details – Content of msg 24 B Class B CS static data report		
Test item	Check	Remark	Result
Transmit a msg 23 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Part Number	Check that part number = 1		Passed
Type of ship and cargo	Check the field content		Passed
Vendor ID			Passed
Call sign			Passed
Dimension / reference for position			Passed

2010-03-04 Ba	Test details – Content of addressed messages 25		
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		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (msg length = 112 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination indicator	Check that value = 1		Passed
Binary data flag	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed
Binary data	Check the field content		Passed