Bundesrepublik Deutschland
Federal Republic of Germany

Bundesamt für Seeschifffahrt und Hydrographie
Federal Maritime and Hydrographic Agency

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Conformance test report of an

AIS system

Equipment under test: **McMurdo**

Type: **M2**

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

Test Report No.: 734.2/0066/2003/S3220

Applicant: McMurdo Limited

SilverPoint, Airport Service Road
Portsmouth PO3 5PB
United Kingdom

Hamburg, 16 December 2004
Federal Maritime and
Hydrographic Agency

by order

Bartels
Test engineer

by order

Preuss
head of
laboratory

nach DIN EN 45001
akkreditiertes Prüflaboratorium

Deutscher Akkreditierungs Rat
DAR
DAT-P-086/98-10

Federal Maritime and Hydrographic Agency
Bernhard-Nocht-Str. 78

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Translation

Deutsche Akkreditierungsstelle Technik (DATech) e.V.
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Deutschen AkkreditierungsRat

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The **German Accreditation Body Technology (DATech) e.V.** confirms that the Testing Laboratory

Bundesamtes für Seeschifffahrt und Hydrographie (BSH)
Abteilung Schifffahrt
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is competent under the terms of DIN EN ISO/IEC 17025 to carry out testing in the fields

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

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The annex is deemed part of this certificate and comprises **13** pages.

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Frankfurt/Main, December 23th, 2003

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

Member in EA, ILAC, IAF

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

General

Applicant:	McMurdo Limited SilverPoint, Airport Service Road, Portsmouth PO3 5PB, United Kingdom
Equipment under test:	
Type:	M2
Manufacturer:	McMurdo Limited SilverPoint, Airport Service Road, Portsmouth PO3 5PB, United Kingdom
Place of test:	BSH test laboratory Hamburg, Room 916
Start of test:	05. April 2004
End of test:	16. December 2004

Test standards[1]:

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)

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

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

1 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	M2	Part No.:		No type label
Delivery date	09.03.04	Serial number		Unit 1 (BSH label)
HW Version:	Delivery date	09.03.04	Version no	0.0.96
	Installation date	09.03.04		
SW Version:	Delivery date	01.04.04	Version no	2808 ?
	Installation date	05.04.04		
SW Version:	Delivery date	03.05.04	Version no	App. : V20, 798D
	Installation date	03.05.04		FPGA: V12, 15DA
SW Version:	Delivery date	05.05.04	Version no	App. : V 21, A9AA
	Installation date	05.05.04		
SW Version:	Delivery date	02.06.04	Version no	App. : V 22, D539
	Installation date	02.06.04		
SW Version:	Delivery date	13.08.04	Version no	App. : V28, 06A4
	Installation date	20.08.04		FPGA: V14, DE3D
SW Version:	Delivery date	02.09.04	Version no	App. : V29, 01D6
	Installation date	03.09.04		
SW Version:	Delivery date		Version no	
	Installation date			

MKD				
Type		Part No.:		
Delivery date	Not yet delivered	Serial number		
HW Version:	Delivery date		Version no	
	Installation date			
SW Version:	Delivery date	24.06.04	Version no	0.3.0
	Installation date	24.06.04		
SW Version:	Delivery date	23.08.04	Version no	0.5.5
	Installation date	23.08.04		
SW Version:	Delivery date	15.09.04	Version no	V 0.7.0
	Installation date	15.09.04		
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type		Part No.:		
Delivery date		Serial number		
HW Version:	Delivery date		Version no	
	Installation date			

1.1.2 EUT system no 2

Transponder				
Type	M2 Transponder	Part No.:	---	
Delivery date	17.05.04	Serial number	09	
HW Version:	Delivery date	17.05.04	Version no	0.0.0
	Installation date	17.05.04		
SW Version:	Delivery date	17.05.04	Version no	App. : V21: A9AA FPGA: V12, 15DA Application:
	Installation date	17.05.04		
SW Version:	Delivery date	02.06.04	Version no	App. : V22: D539
	Installation date	04.06.04		
SW Version:	Delivery date	15.06.04	Version no	App. : V23, 2023
	Installation date	15.06.04		
SW Version:	Delivery date	21.06.04	Version no	App. : V24, BDBA
	Installation date	21.06.04		
SW Version:	Delivery date	09.07.04	Version no	App. : V26, E926 FPGA: V14, DE3D
	Installation date	09.07.04		
SW Version:	Delivery date	13.08.04	Version no	App. : V28, 06A4
	Installation date	16.08.04		
SW Version:	Delivery date	10.09.04	Version no	App.: V32, A6A9 V32.14.0
	Installation date	13.09.04		
SW Version:	Delivery date	28.09.04	Version no	App: V34, 1A70 V34.14.0
	Installation date	29.09.04		
SW Version:	Delivery date	19.10.04	Version no	V36.16.9
	Installation date	19.10.04		
SW Version:	Delivery date	20.10.04	Version no	V37.16.9 New App. V37
	Installation date	20.10.04		
SW Version:	Delivery date	26.10.04	Version no	V37.17.9 New FPGA V17
	Installation date	26.10.04		
SW Version:	Delivery date	08.11.04	Version no	
	Installation date	08.11.04		V41.18.0
SW Version:	Delivery date		Version no	
	Installation date			

MKD				
Type	No Type label		Part No.:	???
Delivery date	24.06.04		Serial number	BSH1
HW Version:	Delivery date		Version no	
	Installation date			
SW Version:	Delivery date	24.06.04	Version no	0.3.0
	Installation date	24.06.04		
SW Version:	Delivery date	16.08.04	Version no	0.4.4
	Installation date	16.08.04		
SW Version:	Delivery date	23.08.04	Version no	0.5.5
	Installation date	23.08.04		
SW Version:	Delivery date	10.09.04	Version no	0.6.4
	Installation date	13.09.04		
SW Version:	Delivery date	15.09.04	Version no	0.7.0
	Installation date	15.09.04		
SW Version:	Delivery date	28.09.04	Version no	0.8.4
	Installation date	29.09.04		
SW Version:	Delivery date	19.10.04	Version no	0.9.9
	Installation date	19.10.04		
SW Version:	Delivery date	08.11.04	Version no	0.11.9
	Installation date	08.11.04		
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna			
Type	GPS Antenna SA-200	Part No.:	-----
Delivery date	28.11.02	Serial number	2002896

1.1.3 EUT system no 3

Transponder				
Type	M2 Transponder	Part No.:	---	
Delivery date		Serial number	10	
HW Version:	Delivery date	17.05.04	Version no	0.0.0
	Installation date	17.05.04		
SW Version:	Delivery date	10.09.04	Version no	App.: V32, A6A9
	Installation date	13.09.04		V32.14.0
SW Version:	Delivery date	26.10.04	Version no	V37.17.9
	Installation date	26.10.04		New FPGA V17
SW Version:	Delivery date	29.10.04	Version no	V39.17.9
	Installation date	29.10.04		
SW Version:	Delivery date		Version no	
	Installation date			

MKD				
Type	M2 Display	Part No.:		
Delivery date	Same display as no 2	Serial number	BSH1	
HW Version:	Delivery date		Version no	
	Installation date			
SW Version:	Delivery date	15.09.04	Version no	0.7.0
	Installation date	15.09.04		
SW Version:	Delivery date	19.10.04	Version no	0.9.9
	Installation date	19.10.04		
SW Version:	Delivery date	29.10.04	Version no	0.10.10
	Installation date	29.10.04		
SW Version:	Delivery date		Version no	
	Installation date			

1.1.4 EUT system no 4

Transponder				
Type	M-2 AIS Transponder	Part No.:	---	
Delivery date	08.11.04	Serial number	353 000034	
HW Version:	Delivery date	08.11.04	Version no	0.0.0
	Installation date	08.11.04		
SW Version:	Delivery date	08.11.04	Version no	V99.146.11
	Installation date	---		
SW Version:	Delivery date	08.11.04	Version no	V41.18.0
	Installation date	08.11.04		
SW Version:	Delivery date	22.11.04	Version no	V46.18.0
	Installation date	22.11.04		
SW Version:	Delivery date	25.11.04	Version no	V47.18.0
	Installation date	25.11.04		
SW Version:	Delivery date	10.12.04	Version no	V50.18.0
	Installation date	10.12.04		= Build V01.02.xx
SW Version:	Delivery date		Version no	
	Installation date			

MKD				
Type	M-2 MKD	Part No.:		
Delivery date	08.11.04	Serial number	0350800276	
HW Version:	Delivery date		Version no	
	Installation date			
SW Version:	Delivery date	08.11.04	Version no	0.9.9
	Installation date	----		
SW Version:	Delivery date	08.11.04	Version no	0.11.9
	Installation date	08.11.04		
SW Version:	Delivery date	22.11.04	Version no	0.12.9
	Installation date	22.11.04		
SW Version:	Delivery date	25.11.04	Version no	0.13.9
	Installation date	25.11.04		
SW Version:	Delivery date	10.12.04	Version no	0.14.9
	Installation date	10.12.04		= Build V01.02.xx
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna			
Type	GPS Antenna SA-200	Part No.:	-----
Delivery date	28.11.02	Serial number	2002896

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	05.04.04	08.04.04	Bartels
1	03.05.04	10.05.04	Bartels
1	02.06.04	04.06.04	Bartels
2	14.06.04	18.06.04	Bartels
2	12.07.04	13.07.04	Bartels
2	16.08.04	26.07.04	Bartels
1	03.09.04	03.09.04	Bartels
2	13.09.04	15.09.04	Bartels
2	29.09.04	29.09.04	Bartels
4	08.11.04	12.11.04	Bartels
4	22.11.04	26.11.04	Bartels
4	29.11.04	03.12.04	Bartels
4	10.12.04	16.12.04	Bartels

1.2.2 Test environment no 2

This Test environment is completely equipped as described in Annex A except the DSC testbox. Mainly operational and interface related tests are done in this environment

Room	BSH Room 632 (6th floor)
Test engineer	K.H. Warnstedt
Location	9° 59,103 E 53° 32,822 N

Equipment no	Start of test	End of test	Test engineer
2	21.06.04	25.06.04	Warnstedt
2	30.08.04	03.09.04	Warnstedt
3	16.09.04	16.09.04	Warnstedt
2	21.10.04	25.10.04	Warnstedt

1.3 Composition

Minimum Keyboard and display (MKD)

☐ Internal ☒ Remote ☐ external

internal GNSS

☐ sync only ☒ backup pos. sensor

1.4 Remarks

Result marking:

Ok	Item is ok, test was successful No colour marking
Dev	slight deviation, no change required No colour marking
Nok	Test of a required item was not successful, change required Colour marking: yellow
Rec	It is recommended to make a change. Colour marking: green
???	temporarily, has to be clarified or discussed Colour marking: yellow

Not yet tested items are marked with a blue background.

Issue of this template: 17.11.2003, modified

1.5 General notes

Here are general problems found in the operation of the EUT, not specific to the actual test point.

General problems			
Date	Item	Remark	Result
04.06.04 Ba	TX not ok	I tried to continue testing with the second unit (which was used for GPS testing) but the TX output power was too low to be received by the VDL analyser. It is received by other units connected with a attenuation of 70 dB, so the power is more than –40 dBm and less than +20 dBm.. 07.06.04: After switching on this morning it was received for some minutes be the VDL analyser. So it seems to be temperatur dependent. Retest 26.08.04 Ba: In the actual test phase there was no problem with TX power	Ok
22.10.04 Wa	Internal GPS module	Sometimes it is necessary to restart the unit in order to get a GPS position looks like the internal communication has some problems at start up Retest 22.11.04 Ba: This problem has not been found in the later tests with new versions	Ok
26.10.04 Ba	Transmissions disabled	After loading new FPGA version V17 all transmissions were disabled. Changing settings, changing FPGA back to version V16 and some other means did not solf the problem. When changing the setting of “Own report” to disabled and to enabled there is in both cases an TXT ouput “All transmissions disabled”. Equipment No 3 does not show this problem. Retest 09.11.04 Ba: The same problem with equipment no. 4, but with the baseband board of equipment 3. Transmissions could not be enabled using MKD but with special sentences applied to the display port. Retest 22.11.04 Ba: The transmissions can be enabled using the MKD now. They are by intention disabled after production to avoid incorrect transmissions until the initial setting has been done.	Ok
01.11.04 Ba	Restart	It seems that there was a restart at 08.03:28 See PI port log M2_rate_1000.sst Retest 11.11.04 Ba: It seems there was a restart again at 10.41 UTC A PI log is provided Retest 22.11.04 Ba:	

		Again a restart found at 21:56 UTC Retest 26.11.04 Ba: During the test overnight there was no restart Further checks required Retest 03.12.04 Ba: In a test running the week from 29.11.04 to 03.12.04, running over night, there was 1 single restart j. Retest 13.12.04 Ba: In a test with a new software version running over weekend from 10.12.04 to 13.12.04 there was no restart.	Ok

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.

29.10.04 Ba	Test details – General documentation		
Test item	Check	Remark	Result
Composition of customer documentation	Check the composition of customer documentation.	The documentation consists of: • Operation Manual • Installation Manual • Technical 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.		Ok
Operating information	Check that an operating manual is included		Ok
Technical information	Check that an technical manual is included		Ok
Installation information	Check that an installation manual is included		Ok
Language	Check that the documentation is written in English		Ok
Some details of installation information			
System overview	Check that an AIS system overview diagram is available		Ok
Mechanical dimensions	Check that mechanical dimension drawings of transponder are available		Ok
	Check that mechanical dimension drawings of MKD are available		Ok
	Check that mechanical dimension drawings of a Connectinon box available	Not applicable, connection box is included in the transponder module	Ok
	Check that mechanical dimension drawings of GPS antenna are available		Ok
	Check that mechanical dimension drawings of VHF antenna are available	VHF antenna is not part of the standard delivery	Ok
Missing information	I'm missing information about the meaning of the abbreviations/status indication of the alarm list like "CV", "CA", "SA" .... Further information about the interpretation of the Security log is missing, e.g. what does the number after the event (e.g. Tx silent" meane, switch off time in hours and minutes?, what does S-xx mean. <u>Retest 24.11.04 Ba:</u> The alarm and security log codes are now explained in detail in the manual		Ok

29.10.04 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	There are screw terminals for the connection	Ok
Siting of antennas	Check that information about siting the GPS antenna is included		Ok
	Check that information about siting the VHF antenna is included		Ok
RF cable requirements	Check that information about cable requirements for GPS antenna is included		Ok
	Check that information about cable requirements for the VHF antenna is included		Ok
Illumination	Check that information about external illumination is included if required	Not required, Display and keyboard are illuminated	Ok

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.

29.10.04 Ba	Test details – Requirements of Interface documentation		
Test item	Check	Remark	Result
a) A and B signal lines	Check that identification of A and B signal lines is included		Ok
b) Output driver	Check that the output drive capability is included	In terms of number of terminated listeners	Ok
c) Talker sentences of PI ports	Check that list of sentences is included		Ok
	Check that unused fields are noted	No list of single fields, therefore unused fields are not noted Retest 10.11.04 Ba: There is a detailled description of each input and output sentence including information about unused fields	Ok
c) Talker sentences of long range port	Check that list of sentences is included	The list of sentences is incorrect. It includes all sentences of the PI port Retest 10.11.04 Ba: List of LR sentences is ok	Ok
	Check that unused fields are noted	No list of single fields, therefore unused fields are not noted Retest 10.11.04 Ba: There is a detailled description of each input and output sentence including information about unused fields	Ok
d) Input load	Check that the input load is included		Ok
e) Input sentences of PI ports	Check that list of sentences is included		Ok
	Check that required and unused fields are noted		Ok
e) Input sentences of long range port	Check that list of sentences is included		Ok
	Check that required and unused fields are noted		Ok
e) Input sentences of sensor inputs	Check that list of sentences is included		Ok
	Check that a list is included for each sensor input if different for the ports	Not required, all sensor ports have the same functionality	Ok
	Check that required and unused fields are noted		Ok
Proprietary sentences	Check that proprietary sentences are listed and	No proprietary sentences are used	Ok

	described		
f) Software version	Check that the relevant software version is included	No information about the software version for which this version of the manual is exactly valid Retest 10.11.04 Ba: The operation manual includes the information that it is illustrates the software version 10.10. This may be changed for the final version of the manual because of newer final MKD software version	Ok
f) Hardware version	Check that the relevant hardware version is included	No information about the hardware version	acc
g) Hardware input/output circuit	Check that information about hardware interface components is included		Ok
h) Standards	Check that the version number and date of update of the relevant standard is included	The version of the 61162 is mentioned. There is a remark that the declaration of conformity includes information of the relevant standards, but this declaration is planned but not yet included in the manual. Retest 10.11.04 Ba: The declaration of conformity at the and of the operation manual includes information of the relevant standards including date or version	Ok

2 14 Operational tests

2.1 14.1 Operating modes / Capability

(4.2)

2.1.1 14.1.1 Autonomous mode

(4.2.1, M.1371 A2/3.3.5)

2.1.1.1 14.1.1.1 Transmit Position reports

Method of measurement

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

Required results

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

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

- Reporting rate
- Message contents
- Slot use

are done in special test items.

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

2.1.1.2 14.1.1.2 Receive Position reports

Method of measurement

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

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

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

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

Required results

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

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

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

2.1.2 14.1.2 Assigned mode

(4.2.1 M.1371A2/3.3.6)

Method of measurement

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

a) Slot offset and increment

b) Designated reporting rate.

Record transmitted messages..

Required results

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

This is a test on operational basis. The details of slot allocation are checked in a special test on link layer (see 4.6.4 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 4.6.4 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.

22.06.04 Wa	Test details - Interrogation of msg 3		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an ACA 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	Retest 02.09.04 Wa VDO output not found Retest 16.09.04 Wa Only transmitted for received transponders	Ok
AIABK acknowledgement	Record and check the AIABK acknowledgement	ÁIABK,000003006,A, 15,,3 AIS channelnumber has to be a NULL field because the channel where the ack will be received is unknown Retest 02.09.04 Wa Somtimes with channel number and sometimes without Retest 16.09.04 Wa	Ok
RX of request	Check that message is received by addressed transponder (VDM)		Ok
Received by VDL Analyser	Check request on VDL analyser		Ok
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Ok
RX of response (VDM)	Check that the response message 3 is received by EUT (VDM)		Ok

22.06.04 Wa	Test details - Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an ACA 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	Retest 02.09.04 Wa VDO output not found Retest 16.09.04 Wa Only transmitted for received transponders	Ok
AIABK acknowledgement	Record and check the AIABK acknowledgement	ÁIABK,000003006,A, 15,,3 AIS channelnumber has to be a NULL field because the channel where the ack will be received is unknown Retest 02.09.04 Wa Somtimes with channel number and sometimes without Retest 16.09.04 Wa	Ok
RX of request	Check that message is received by addressed transponder (VDM)		Ok
Received by VDL Analyser	Check request on VDL analyser		Ok
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Ok
RX of response (VDM)	Check that the response message 5 is received by EUT (VDM)		Ok

28.10.04 Ba	Test details - Interrogation of msg from base stations		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an ACA 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		Ok
	Record and check the AIABK acknowledgement	$AIABK,00001005,,15,,3	Ok
Request msg 20	Check the VDO output on PI		Ok
	Record and check the AIABK acknowledgement	$AIABK,00001005,,15,,3	Ok
Request msg 22	Check the VDO output on PI		Ok
	Record and check the AIABK acknowledgement	$AIABK,00001005,,15,,3	Ok

22.06.04 Wa	Test details - Interrogation with 2 requests		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an ACA 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	Retest 02.09.04 Wa VDO output not found Retest 16.09.04 Wa Only transmitted for received transponders	Ok
AIABK acknowledgement	Record and check the AIABK acknowledgement	ÁIABK,000007001,A,015,,3 ÁIABK,000003006,B,015,,3 AIS channelnumber has to be a NULL field because the channel where the ack will be received is unknown Retest 02.09.04 Wa	Ok
RX of request	Check that message is received by one of the addressed transponders (VDM)		Ok
Received by VDL Analyser	Check request on VDL analyser		Ok
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Ok
RX of response (VDM)	Check that the response message 5 is received by EUT (VDM)		Ok

2.1.3.2 14.1.3.2 Interrogation response

Method of measurement

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

Record transmitted messages and frame structure.

Required results

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

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

26.08.04 Ba	Test details - Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 5, slot offset = 0 (auto select) A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Ok
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Ok
Response on VDL	Check the response on VDL with the VDL analyser, note slot offset	Slot offset = 79	Ok
Response channel	Check that the response is transmitted on the request channel		Ok

26.08.04 Ba	Test details - Interrogation of msg 3		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3 with given slot offset = 100 A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Ok
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Ok
Response on VDL	Check the response on VDL with the VDL analyser		Ok
Slot selection	Check that the slot offset defined in the request is used	Slot offset of 10 and 100 ok	Ok

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

2.1.4 14.1.4 Addressed operation

(6.1 M1371 A2/3.3.8)

2.1.4.1 14.1.4.1 Transmit an addressed message

Method of measurement

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

Record the transmitted messages.

Required results

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

More detailed tests of addressed message including channel use and transmission retry are made in 6.1 “”.

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

15.06.04 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		Ok
Channel	Check Tx channel		Ok
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentence		Ok
RX of request	Check that message is received by addressed transponder (VDM)		Ok
Received by VDL Analyser	Check msg on VDL analyser		Ok
TX of ackn. msg 7 (VDO)	Check that ackn msg 7 is transmitted by addressed transponder (VDO)		Ok
Use of Appl. ID	Check for proper use of DAC and FI for text messages when using MKD	Could not be tested because MKD crashed when trying to send an addressed message. Retest 02.09.04 Wa Binary Msg. not implemented	Ok
RX of msg 7 (VDM)	Check that the ackn. msg 7 is received by EUT (VDM)		Ok

AIABK acknowledgement		See note) $AIABK,000001028,B,006,2,1 $AIABK,000001028,B,007,2,0 <u>Retest 12.07.04 Ba:</u> Only one ABK as required: $AIABK,000001028,A,07,2,0 The message ID in the ABK is the message ID of the acknowledgement (7). It should be the ID of the addressed message (6). The external Unit has send a command to transmit a msg 6 and expects an ackn to this msg 6, telling that the msg 6 has been successfully transmitted to the receiving station. <u>Retest 17.08.04 Ba:</u> No change, message ID in ABK is still 07 instead of 06 Retest 16.09.04 Wa	Ok
Add invalid character to encapsulated data, e.g. x,y,z			
Transmission	Check that message is not transmitted		Ok
ABK sentence	Check that ABK message with ackn. type 2 (could not be broadcast) is output on PI		Ok
Acknowledgement	Check AIABK or MKD for corresponding pos. and neg. ack.		Ok

Note) There are 2 ABK output sentences:

- the first is output when the msg 6 is transmitted, in case of a repetition of msg 6 up to 4 times.
- The second sentence is output when the ackn. msg 7 has been received (or at time-out if there is not ackn)

There should be only one ABK when a msg command is completely finished, in case of an addressed msg either when a ackn. is received or at time-out if no ackn is received. The single transmissions are indicated by the VDO sentence, not by ABK.

Message ID: The message ID in the ABK is a variable length field, max value is 14. Therefore I recommend to use only 1 or 2 characters for it, not 3.
<u>Retest 12.07.04 Ba:</u> The length of the message ID field is now 2 characters (ok)

15.06.04 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		Ok
Channel	Check Tx on channel A		Ok
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentence		Ok
Received by VDL Analyser	Check msg on VDL analyser		Ok
RX of msg 13 (VDM)	Check that the ackn. msg 13 is received by EUT (VDM)		Ok
acknowledgement	Check AIABK or MKD for corresponding pos. and neg. ack.	See note of msg 6) $AIABK,000001028,B,012,2,1 $AIABK,000001028,B,013,2,0 Retest 12.07.04 Ba: Only one ABK as required: $AIABK,000001028,A,07,2,0 The message ID in the ABK is the message ID of the acknowledgement (13). It should be the ID of the addressed message (12). (see msg 6) retest 16.09.04 Wa	Ok Ok

2.1.4.2 14.1.4.2 Receive addressed message

(4.2)

Method of measurement

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

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

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

Record transmitted messages and frame structure.

Required results

Check that EUT transmits the appropriate acknowledgement message. Confirm that

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

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

Further tests of received addressed messages including acknowledgement see 6.1.2 .

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

15.06.04 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		Ok
	Check message text		Ok
Addressed to other AIS transponder	Check that no VDM output on PI or on display of EUT		Ok

2.2 14.2 Multiple slot messages

(4.2 M.1371 A2/5.2.1)

2.2.1 14.2.1 5 slot messages

(M.1371 A2 / 5.2.1)

Method of measurement

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

Required results

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

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

22.06.04 Wa	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		Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	AIABK,000000000,B,008,6,3 MMSI field and AIS channel should be null fields, message number without leading 0 Retest 02.09.04 Wa	Ok
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
Message on VDL	Check the broadcast message on VDL analyser		Ok
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Ok

25.06.04 Wa	Test details - Safety related broadcast message 14		
Test item	Check	Remark	Result
Transmit a safety related broadcast messages 14 with 120 data bytes of binary data by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_safety.sst: AIS channel for broadcast is 2: (ch B) The file contains 4 BBM sentences with in total 120 data bytes or 160 characters			
VDO output of EUT	Check the VDO output on PI		Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	AIABK,000000000,B,014,6,3 MMSI field and AIS channel should be null fields, message number without leading 0 Retest 16.09.04 Wa	Ok
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
Message on VDL	Check the broadcast message on VDL analyser		Ok
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Ok

2.2.2 14.2.2 Longer messages

(M.1371 A2 / 5.2.1)

Method of measurement

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

Required results

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

25.06.04 Wa	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	Not supported by EUT	Acc.
Message on VDL	Check that no message is received by VDL analyser		
AIABK acknowledgement	Record the AIABK output, check that type = 2 (could not be broadcast)		

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.

02.09.04 Wa	Test details - Binary broadcast message 8		
Test item	Check	Remark	Result
Transmit a binary broadcast messages 8 with 123 databytes 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	Not supported by EUT	Acc.
AIABK acknowledgement	Record and check the AIABK acknowledgements, type should be 3		
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		
Message on VDL	Check the broadcast message on VDL analyser		
Rx on other transponder (VDM)	Check the VDM output of an other transponder		

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.

25.06.04 Wa	Test details – content of msg 1		
Test item	Check	Remark	Result
Internal GNSS is in use, no external sensor inputs			
MMSI	Check MMSI and compare with MKD display		Ok
Navigational status	See below		Ok
Position	Check the values of lat and lon and compare with MKD display		Ok
Speed	Check the values of SOG and COG and compare with MKD display		Ok
Heading/ROT	Check that the values of heading and ROT are default		Ok
Position accuracy flag	Check flag with and without differential corrections by msg 17	Test 23.08.04 Ba:	Ok
Time stamp	Check time stamp		Ok
Comm state	Check for availability, detailed test in 5		Ok
Default values	Check that default values for LAT, LON, SOG, COG are transmitted if internal GNSS is unavailable		Ok

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

2.3.2 Information content of msg 5

25.06.04 Wa	Test details – Content of msg 5		
Test item	Check	Remark	Result
Check of the contents of msg 5 (static and voyage related data) Data can be changed using MKD or VSD/SSD input at PI			
MMSI	Check value in msg 5		Ok
AIS version indicator	Check that version is 0		Ok
IMO number	Check value in msg 5		Ok
Call sign	Check value in msg 5		Ok
Name of ship	Check value in msg 5		Ok
Type of ship and cargo type	Check value in msg 5	Allways 0 changing via MKD not possible Retest 12.07.04 Ba: Type of ship entered by VSD sentence is correctly transmitted in msg 5	Ok
Reference point for internal GPS			
Reference point A	Check value in msg 5	Always values for ext. EPFS Retest 12.07.04 Ba: MKD shows: A=120-5=115 Msg 5: 0 It seems that this is a problem of the MKD and not of the transponder unit because external reference point applied by SSD sentence is transmitted correctly Retest 23.08.04 Ba: Display of value A and ship length is ok now	Ok
Reference point B	Check value in msg 5		Ok
Reference point C	Check value in msg 5		Ok
Reference point D	Check value in msg 5	Retest 12.07.04 Ba: MKD shows: A=25-2=23 Msg 5: 1 Retest 23.08.04 Ba: Display of value A and ship length is ok now	Ok
Reference point for EPFS			
Reference point A	Check value in msg 5		Ok
Reference point B	Check value in msg 5		Ok
Reference point C	Check value in msg 5		Ok
Reference point D	Check value in msg 5		Ok
Tx of msg 5	Check if msg 5 is transmitted at change of position source		Ok
Voyage related data			

ETA	Check value in msg 5		Ok
Maximum present static draught	Check value in msg 5	14 instead of 1.4 transmitted Retest 12.07.04 Ba: Draught value is ok (11.5)	 Ok
Destination	Check value in msg 5		Ok
DTE flag can be checked in connection with 2.9.2.5 “14.9.2.5 Remote MKD disconnection, when so configured”. Check the flag during that test and enter result her			
DTE on	Check that DTE flag = 0	DTE = 1 Retest 12.07.04 Ba: Still not ok. This seems not to be a problem of msg but of the supervision of MKD connection. The alarm ALR ID 008 “MKD connection lost.” Is output as active. Related to this DTE=1 would be correct Retest 02.09.04 Wa	 Ok
DTE off	Check that DTE flag = 1		Ok
Type of EPFS			
Apply simulated GLL,VTG, GDT and ROT sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst. Change talker according to test item			
Talker = GP	Check type of EPFS = 1	Allways = 1 Retest 12.07.04 Ba: There is no msg 5 transmitted at change of source, For the test I had to request msg 5 by msg 15 (or wait 6 min) Retest 02.09.04 Wa Msg 5 transmitted Value = 1	 Ok
Talker = GL	Check type of EPFS = 2		Ok
Talker = GN	Check type of EPFS = 3		Ok
Talker = LC	Check type of EPFS = 4		Ok
Talker = IN	Check type of EPFS = 6		Ok
Talker = other	Check type of EPFS = 0	RA = 0	Ok

2.4 14.4 Reporting rates

(6.5.2)

2.4.1 14.4.1 Speed and course change

(6.5.2)

Method of measurement

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

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

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

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

d) Make speed and/or heading sensor unavailable.

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

Required results

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

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

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

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

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

06.04.04 Ba	Test details – Change of reporting rate by speed		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Record the VDL data of the procedure according to the following test items, generate a table and diagram from that data and check the items using the recorded data. Change speed according to the test items and record VDL data. After each change wait until new reporting rate is clearly established. Lines are related to Excel table reprate_speed.xls			
Speed = 10 kn	Check that reporting rate is 10 s		Ok
Speed = 15 kn	Check slot allocation using msg 3 for new reporting rate		Ok
	Check that slot allocation for the new reporting rate has started after 2 transmissions		Ok
	Check that new rate is established within 1 minute		Ok
	Check that new reporting rate is 6 s		Ok
Speed = 25 kn	Check slot allocation using msg 3 for new reporting rate		Ok
	Check that slot allocation for the new reporting rate has started after 2 transmissions		Ok
	Check that new rate is established within 1 minute		Ok
	Check that new reporting rate is 2 s		Ok
Reduction of speed to Speed = 15 kn	Check slot allocation by deallocation of slots, Msg 3 not required for new reporting rate	2 times a msg 3 is used to allocat now slots	acc
	Check that new rate starts after 3 min and is established within 4 minutes		Ok
	Check that new reporting rate is 6 s		Ok
Reduction of speed to Speed = 10 kn	Check slot allocation using msg 3 for new reporting rate		Ok
	Check that new rate starts after 3 min and is established within 4 minutes		Ok
	Check that new reporting rate is 10 s		Ok

06.04.04 Ba	Test details – Change of reporting rate by heading		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Record the VDL data of the procedure according to the following test items, generate a table and diagram from that data and check the items using the recorded data. Change speed according to the test items and record VDL data. After each change wait until new reporting rate is clearly established. Lines are related to Excel table reprate_speed.xls			
Change of heading from 359° to 0°	Check that the reporting rate is not increased		Ok
Change of heading from 0° to 359°	Check that the reporting rate is not increased		Ok
Speed = 10 kn Heading = 0	Check that reporting rate is 10 s		Ok
Speed = 10 kn Increase heading by 10 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate		Ok
	Check that new rate is established immediately		Ok
	Check that new reporting rate is 3 1/3 s		Ok
Speed = 10 kn Stop Increasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)		Ok
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change		Ok
	Check that new reporting rate is 10 s again		Ok
Speed = 15 kn	Wait until speed is 6 s with msg type 1		
Speed = 15 kn Decrease heading by 10 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate		Ok
	Check that new rate is established immediately		Ok
	Check that new reporting rate is 2 s		Ok
Speed = 15 kn Stop decreasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)		Ok
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change		Ok
	Check that new reporting rate is 6 s again		Ok
Speed = 25 kn	Wait until speed is 2 s with msg type 1		

Speed = 25 kn Increase heading by 10 degr. steps sometimes	Check that no change		Ok
Speed = 25 kn Stop Increasing heading	Check that no change		Ok

06.04.04 Ba	Test details – Reporting rate - Sensor unavailable		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Change speed according to the test items and record VDL data.			
Speed = 10 kn	Check that reporting rate is 10 s		Ok
Speed = 15 kn	Check that reporting rate is 6 s		Ok
Speed sensor unavailable (internal source made inavailable)	Record time from stopping speed input to reverting report rate	Reduction of reporting rate starts immediately after stop of speed information. There should be a delay of 3 min before recucing reporting rate. The reason is the same as in case of speed reduction. Retest 03.05.04 Ba: Reporting rate is reduced after 3 min	Ok
	Check that new reporting rate is 10 s		Ok

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

2.4.2 14.4.2 Change of navigational status

(6.5.2)

Method of measurement

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

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

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

c) set NavStatus to other values

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

Required results

a) Reporting rate shall be 3 min.

b) Reporting rate shall be 10 s.

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

15.06.04 Ba	Test details – Reporting rate		
Test item	Check	Remark	Result
Apply simulated sensor data to the sensor input. File name is ais01_gll_vtg_hdt_rot.sst Change Navigation status and speed according to test items			
Navigation status = 0 (under way using engine Speed = 2 kn	Check that reporting rate is 10 s		Ok
Nav. status = 1 (at anchor) Speed = 2 kn	Check that reporting rate is 3 min		Ok
	Check that the position report is interleaved with the msg 5	Msg 5 is independent of msg 3 Retest 12.07.04 Ba: Msg 5 and msg 3 are interleaved	Ok
Nav. status = 1 Speed = 4 kn	Check that reporting rate is 10 s		Ok
Nav. status = 5 (moored) Speed = 2 kn	Check that reporting rate is 3 min		Ok
Nav. status = 2 (not under command) Speed = 2 kn	Check that reporting rate is 3 min	Reporting rate is 10 s	acc
Nav. status = 6 (Aground) Speed = 2 kn	Check that reporting rate is 3 min	Reporting rate is 10 s	acc
Nav. status = 3 or other Speed = 2 kn	Check that reporting rate is 10 s		Ok

Note) According to ITU-R M1371 §4.3.1.3 “When the vessel is at anchor, moored, not under command or aground, which is indicatred 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”.

15.06.04 Ba	Test details – Check of slot handling		
Test item	Check	Remark	Result
Apply simulated sensor data to the sensor input. File name is ais01_gll_vtg_hdt_rot.sst Change Navigation status according to test items			
Navigation status = 0 (under way using engine Speed = 2 kn	Check that reporting rate is 10 s		Ok
Change Nav status to “at anchor”	Check that the used slots are release by time-out 0 and slot offset = 0k	Slots are not released but EUT stopps transmission of msg 1 immediately Retest 12.07.04 Ba: Slots are release by time-out 0 and slot offset = 0k	Ok
	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		Ok
Change Nav status back to 0	Check that a procedure like network entry is performed		Ok

2.4.3 14.4.3 Assigned reporting rates

(6.5.2)

Method of measurement

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

a) initial slot offset and increment;

b) designated reporting rate.

Change course, speed and NavStatus. Record transmitted messages.

Required results

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

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

More detailed tests are made in 4.6.4 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.

15.06.04 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 = 2 kn • Send assignment cmd	Check that slot offset = 225 and reporting rate is 6 s And msg type = 2		Ok
In assigned mode • change NavStatus to 1 (at anchor)	Check that Navstatus has no effect: EUT maintains assigned mode	EUT immediately stops transmission of assigned mode. Retest 12.07.04 Ba: Assigned mode is continued	Ok
In autonomous mode: NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd	Check that the assignment command is accepted	- Assignment command is received (VDM) but ignored - After changing Navstatus to 0 and speed to 10 kn the reporting rate is 10 kn (correct for autonomours mode) but the msg type is 2 Retest 12.07.04 Ba: Assignment command is executed correctly	Ok
Nav Status = 0, speed = 10 kn • Send assignment	Check that assignment command is executed		Ok
• Increase speed to 15 kn	Check that EUT maintains assignment mode		Ok
• Increase speed to 25 kn	Check that EUT increases reporting rate to 2 s and		Ok
	Check if msg type = 1 or msg type 2 is used (rescheduling with msg 3)	Msg 2 is used after rescheduling with msg 3. After time-out the msg type is changed to 1	Ok

NavStatus = 0, Speed = 15 kn: • Send assignment cmd	Check that EUT changes to assigned mode	The msg type is changed to 2, but the old message schedule is continued.. This would be ok in case of a rate assignment (same reporting rate), but in case of a slot assignment the slots have to be changed to the assigned slots. Only the first assigned slot (slot 0) is used and added to the old slots <u>Retest 12.07.04 Ba:</u> Assignment command is executed now, following errors: 1) The slot on channel B have got an offset of 6 to the assigned slot, the distance between the slots is 450 slots as required. In a second test (with heading change) this was ok 2) The first 4 slots of the frame didn't get the correct timeout (0, 6, 0, 0) instead of 5 of the other slots. 3) In these 3 msg with time-out 0 there is a wrong slot offset (1,2,1) allocating slots which are never used <u>Retest 18.08.04 Ba:</u>	
		1) This item is ok now in the retest.	Ok
		2) The first 2 slots of the frame have got the wrong time-out value 0 3) The msg with time-out 0 in these 2 slots allocate messages which are never used 4) Recommenation: The msg type in the last frame of the assigned mode (with time-out 0) is 1. I recommand to use msg 2 in this frame because these messages are clearly part of the assigned mode and use reserved and assigned slots. <u>Retest 13.09.04 Ba:</u>	
		2) The first 2 slots of the frame have got the correct time-out value now.	Ok
		3) Therefore there are no unused slot allocations	Ok
		4) The msg type in the last assigned mode frame´Is 2	Ok
		5) the timeouttime- 6) 7)	

In assigned mode: • Change heading	Check that reporting rate is increased to 2 s		Ok
	Check the methode of increasing the reporting rate (msg 3 inserted between msg 1 or 2)	The assigned mode is continued and additional msg 3 are inserted temporarily, keep flag set to 0 (ok) This is generally ok but there are a lot of failures in the implementation, see below: Retest 12.07.04 Ba: I cannot really find an improvement. It is difficult to recognize what really happens. Please evaluate the Excel sheet of the test. There are similar or same problems as in the previous test Retest 18.08.04 Ba: Increasing of reporting rate is ok now	Ok
	It is difficult to identify all problems in the record and to understand what happens. Please check the excel sheet carefully.		
	Channel A msg	The addition of slots on channel B starts correct, The addition of slots on channel A also starts immediately, but is then delayed by slot increment of 1060 (lint 26) by a half frame. Retest 18.08.04 Ba: Slot increment is ok	Ok
	More msg 3 chains	For each msg 2 (on channel 1) with time-out 0 a new chain with msg 3 is started. This lead to an increasing number of msg 3 (e.g 3 msg in 4 slots (line 54...56) and 4 msg in 8 slots (line62...65)). Some of these slots are keept for the next frames, when heading change is already finished. Retest 18.08.04 Ba: Now there is one msg 3 chain an channel A and one on channel B	Ok
	End of assigned mode	The end of the assigned mode is very chaotic and it takes about 5 frames until the reporting rate is more or less correct. Retest 18.08.04 Ba: The end of assigned mode is ok and not affected by the heading change	Ok

16.06.04 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 = 2 kn • Send assignment cmd	Check that slot offset = 225 and reporting rate is 6 s And msg type = 2		Ok
In assigned mode • change NavStatus to 1 (at anchor)	Check that Navstatus has no effect: EUT maintains assigned mode	EUT immediately stops transmission of assigned mode. Retest 12.07.04 Ba: Assigned mode is continued	Ok
In autonomous mode: NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd	Check that the assignment command is accepted	- Assignment command is received (VDM) but ignored - After changing Navstatus to 0 and speed to 10 kn the reporting rate is 10 kn (correct for autonomours mode) but the msg type is 2 Retest 12.07.04 Ba: Assignment command is executed correctly	Ok
Nav Status = 0, speed = 10 kn • Send assignment	Check that assignment command is executed		Ok
• Increase speed to 15 kn	Check that EUT maintains assignment mode		Ok
• Increase speed to 25 kn	Check that EUT increases reporting rate to 2 s and		Ok
	Check if msg type = 1 or msg type 2 is used (rescheduling with msg 3)	Msg 2 is used after rescheduling with msg 3. After time-out the msg type is changed to 1	Ok
NavStatus = 0, Speed = 15 kn: • Send assignment cmd	Check that EUT changes to assigned mode		Ok
In assigned mode: • Change heading	Check that reporting rate is increased to 2 s		Ok
	Check the methode of increasing the reporting rate (msg 3 inserted between msg 1 or 2)		Ok

	General problems of rate assignment		
Date	Item	Remark	Result
06.04.04 Ba	Rate assignment	After a rate assignment command (msg 16) with a reporting rate of 1000/10min = 60/min the following problem happend: It seems that the EUT tried to use the right reporting rate of 600/10min, but in the first 2 frames it was partly transmitting on channel 1 only, in the 3rd frame it was completely transmitting on channel A only. The channel B slots are correctly released. (see attached Excel sheet) After the 3rd frame the unit stopped operation: not transmission on VHF, no PI and display port output. A repetition of the test was ok Retest 03.06.04 Ba: Could not be retested because msg 16 was not received Retest 19.08.04 Ba: No improvement, some remarks: Start of assigned mode is correct, old slots are released and new slots are allocated using msg 3 with the correct reporting rate of 1 s Allocation on channel B stops to early, at the and of the UTC frame. The last allocated slot (slot 42) in the next UTC frame is not used. Allocation on channel A is correctly finished in slot 758. The time-out of all msg 2 in the next frame is 0, should be 3...7. The msg 2 on channel B get the slot offset 0, consequently the transmission on channel B is stopped at the end of this frame. The msg 2 on channel A get slot offset values counting from 0...29 and then from 0 ...24. This is completely incorrect. The slots allocated by this slot offset are (fortunately) not used. In the next frame the slot offset of all msg 2 on channel A is set to 0 (time-out value always 0). Consequently the transmission is stopped completely after this frame. The EUT does not start transmission again (checked for more than 30 min). Retest 13.09.04 Ba: no change	

01.11.04 Ba	Repetition of rate assignment test (Excel sheet rate_assignment_1000_4.xls)	The behaviour is completely different, but there is still a number or problems in this test: In most transmissions on channel B and some transmissions on channel A the slot timing is incorrect. There is an offset of ½ slot, the transmission starts in the middle of the slot. The slot mumber of these transmissions is correct, for the transmissions with the correct T2 timing there is an offset of slot number of 1. Some slots are already released at time-out 4 (line 195) and time-out 2 (lines 284 and 299) At the end of the assigned mode the folloing is incorrect: There are invalid slot numbers of 16379 in 3 position reports (verified by VDO output check) There are invalid slot offset values of –5 in 2 messages (lines 428 and 430) and –6 (line 439) The start time-out in line 416 is 2, should be in the range of 3...7 The time-out in lines 428 and 430 is 0, should be in the range of 2...6 The time-out in the next frame is changed from 6 to 2 (slot 1395, slot 2115), and from 6 to 0 (slot 242)	
01.11.04 Ba	Repetition of rate assignment test (Excel sheet rate_assignment_1000_5.xls)	A repetition of the test was again completely different but also incorrect • About 10 s after rescheduling to the assigned reporting rate is finished the EUT stops transmission for 1 minute. Then there is a rescheduling/network entry to the autonomous reporting rate of 10 s • The msg type remains at 2 (checked for > 2 hours) instead of 1	
10.11.04 Ba	Repetition of rate assignment test:	In to repetitions of the rate assignment of 1000slots/10min there was no problem	Ok

2.4.4 14.4.4 Static data reporting rates

(6.5.2)

Method of measurement

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

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

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

Required results

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

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

17.06.04 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	The static data reporting rate is 6 min At the 6 min interval the msg 5 is transmitted on both channels. This increases unneccessary the channel load Retest 12.07.04 Ba: A single transmission on alternating channels	Ok Ok
b) Change static data using SSD sentence short time after regular msg 5	Check that msg 5 is transmitted within 1 min		Ok
	Check that msg 5 is transmitted only if an item has been changed	Msg 5 is transmitted also after repetition of the same SSD sentence Retest 12.07.04 Ba: No Tx of msg 5 after repetition of same SSD	 Ok
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	Regular msg 5 is transmitted 6 min after last regular msg 5	
Change voyage related data using VSD sentence	Check that msg 5 is transmitted within 1 min	Remark: There is no need to send msg 5 when the navigational status has been changed because it is not part of msg 5 but of msg 1,2,3.	Ok
	Check that msg 5 is transmitted only if an item has been changed	Msg 5 is transmitted also after repetition of the same VSD sentence Retest 12.07.04 Ba: No Tx of msg 5 after repetition of same VSD	 Ok
Change static data using MKD	Check that msg 5 is transmitted within 1 min	MKD not available Retest 12.07.04 Ba: Msg 5 is transmitted after change of static data on MKD	 Ok
Change position source with different ref. point data (see 61993 6.10.3.4)	Check that msg 5 with ref point of new source is transmitted before next transmission of pos. report	If this is not done before next transmition of position report there will be a position jump on the display system of near targets.	Ok

2.5 14.5 Security

(6.6)

Method of measurement

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

Required results

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

25.06.04 Wa	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	No log entry found Retest 16.09.04 Wa Log found but it possible to delete the log Retest 22.10.04 Wa : Events sorted only by time . Expected is sorting first by date and then by time <u>29.10.04 Wa:</u> Events are sorted now by date and time <u>Retest 10.11.04 Ba:</u> There seems to be no sorting Shown events: 06:48:39 26 Oct 04 06:48:37 ??? (out of screen) 06:47:08 26 Oct 04 22:14:09 05 Oct 00 ??? 14:44:06 09 Nov 04 <u>Retest 25.11.04 Ba:</u> Security events are listed in the correct time order	Ok
Read out recorded data	Check that all switch off times > 15min are correctly recorded	 <u>Retest 10.11.04 Ba:</u> Unit was switched off form 08:28 to 09:10 UTC. The only new entry found was: “08:10:22 S-19 Tx Silent 0000:16 on 10 Nov 04” What does that mean, and how does that match the switch off event? Switch off time 11:53 ...13:12 No entry in security log	Ok

		Retest 26.11.04 Ba: All Power off, silent mode (Tx/Rx mode 3) and quiet mode (Tx manually disabled) times are logged. Currently 8 entries checked, test will be continued until 10 entries are checked	Ok
If the EUT supplies a "silent mode" (no transmission)	Check that all silent mode times > 15min are correctly recorded	22.10.04 Wa : Not found 29.10.04 Wa: All "own reports enabled/disabled" messages are logged. Therefore the real switchoff events are removed from display Retest 10.11.04 Ba: Only Tx/poer off times of more than 15 minutes are logged Retest 11.11.04 Ba: Silent mode times by "Transmitter state: disabled" are logged correctly	Ok
Area Tx/Rx mode 3	Check that all silent mode times by area setting TX/Rx mode=3 for a duration > 15min are correctly recorded	Is not recorded (Tx/Rx mode 3 from 11:36 to 12:09 UTC) Retest 22.11.04 Ba: Mode 3 time is logged correctly	Ok
Display	The entry "transmitter enabled" is too long so that the date of the event can not be read. There is also no way to make it visible by scrolling. We recommend to use the text "Tx enabled". Retest 23.11.04 Ba: "Tx silent" is used now for silent mode times		Ok

2.6 14.6 Initialisation period

(6.7 M.1371 A2/3.3.3)

Method of measurement

Set up standard test environment with all sensors available.

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

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

Required results

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

29.09.04 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	EUT starts transmission after 1min15s (not inside an area) Inside an area it starts transmission after 2min15s	Ok
b) Switch off EUT for approx. 0.5 s	Check that EUT starts transmission within 2 min	EUT starts transmission after 1min25s	Ok

2.7 14.7 Channel selection

(6.9)

Method of measurement

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

a) manually,

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

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

d) By transmission of DSC telecommand to EUT

Record the VDL messages.

Required results

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

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

27.08.09 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 <u>manually</u>: 2 simplex channels 25 kHz spacing 25 kHz bandwidth	Check that channels are used	Could not be tested because the MKD became inoperative when entering a channel Details see note) <u>Retest 29.09.04 Ba:</u> Channels could be changed on MKD and are used by the EUT	Ok
	Check bandwidth		Ok
	Check TXT output at PI		Ok
	Check ACA output at PI		Ok
b) Enter by using <u>msg 22</u>: 1 duplex channel 25 kHz spacing 25 kHz bandwidth	Check that channels are used		Ok
	Check bandwidth		Ok
	Check TXT output at PI		Ok
	Check ACA output at PI		Ok
c) Enter by <u>ACA sentence</u>: 1 duplex channel 25 kHz spacing 12.5 kHz bandwidth	Check that channels are used		Ok
	Check bandwidth		Ok
	Check TXT output at PI		Ok
	Check ACA output at PI		Ok
	Check MKD display	On the MKD there the bandwith is still displayed “Auto” instead of “Narrow” <u>Retest 29.09.04 Ba:</u> MKD shows: 12.5	Ok
d) Enter by <u>DSC</u> 2 simplex channels 12.5 kHz spacing 12.5 kHz bandwidth	Check that channels are used		Ok
	Check bandwidth		Ok
	Check TXT output at PI		Ok
	Check ACA output at PI		Ok
	Check MKD display	On the MKD the channels are displayed as A=1001 and B=1001. Setting is A=0272 and B=0273. <u>Retest 29.09.04 Ba:</u> MKD shows the correct channels	Ok

Note) I wanted to change the channel A of an existing active area.
Old channels: A=2084, B=2086
After entering the password I changed the channel A to 0006. After entering the 4 digits using the virtual keypad on the screen I selected “Done” on this keypad and pressed the “Enter” key. After pressing this “Enter” key the MKD became completely inoperative. It did not react on any key. After restart it worked again.

I tried the same a second time and could reproduce the failure, it became again interoperative.

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.

29.09.04 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		Ok
Short circuit of VHF antenna terminal	Check that EUT starts transmission within 2 min after refitting the antenna		Ok

2.9 14.9 Alarms and indicators, fall-back arrangements

(6.10)

General alarm and indication problems			
Date	Item	Remark	Result
25.06.04 Wa	Note : it is required that inactive alarms (status V,V or V,A) are output with a repetition rate of 1 minute. Repetition rate for active alarms is 30 seconds !! It is not very helpfull to define additional alarms that describe a status that is already described with an 'official' alarm sentence acording to 61993-s (082 Sensor HDT timeout) instead of (032 Heading lost/ivalid) : Recommendation : 1. an alarm becomes active : output a sentence with status A,V every 30 sec. 2. An acknolege for the alarm is received (MKD or PI) send ALR sentence with status A,A every 30 sec. 3. The alarm becomes inactive : send the ALR sentence with the status V,A or V,V for alarms that are not ack only once 4. No alarm pending : an output of alr sentence 006,general failure with the status V,V once a minute is recommended as the ONLY output.		Note
25.06.04 Wa	It is possible to define additional messages for alarm handling and txt-messages but it is not useful to add messages with the nearly same content (HDT timeout <> Heading invalid) and it is required that the repetetion rate for active alarm msg is 30 sec. Recom: remove all additional 'timeout' messages from PI output Retest 29.10.04 Wa: Standard messages are use if available		Ok
02.09.04 Wa	Alarm output of EUT is still active after an alarm becomes inactive somtimes it is possible to use the CLEAR ALARM button but after playing with different menu levels the CLEAR button disappears from menu :		Note
Retest 29.10.04 Ba:	Handling of the alarms is now according the the requirements of the IEC 61993-2 standard. Inactive alarms are output every 60 s		Ok

02.09.04 Wa	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		Ok

2.9.1 14.9.1 Loss of power supply

(6.10.1.2)

Method of measurement

Disconnect power supplies of the EUT.

Required result

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

02.09.04 Wa	Test details - Loss of power supply		
Test item	Check	Remark	Result
Switch off power supply	Check that alarm relay output is active.		Ok

2.9.2 14.9.2 Monitoring of functions and integrity

(6.10.2)

2.9.2.1 14.9.2.1 Tx malfunction

Method of measurement

Disable the transmitter by disconnecting the antenna.

Required result

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

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

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

09.11.04 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	The TX malfunction alarm can not produced by disconnection of antenna, only by internal Tx malfunctions as described in the documentation.	acc
ALR output	Check that ALR sentence ID 001 is output at PI		N/A
ALR output repetition	Check that the ALR sentence is repeated with a rate of 30 s		N/A
Alarm relay	Check that alarm relay is activated		N/A

MKD display	Check that the alarm is displayed on the MKD		N/A
Send an ACK sentence	Check that alarm relay deactivated		N/A
	Check that ALR sentence is updated		N/A
	Check that alarm display on the MKD is updated		N/A
Reconnect VHF antenna	Check that ALR sentence is updated		N/A
	Check that alarm display on the MKD is updated		N/A

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.

09.11.04 Ba	Test details - Antenna VSWR		
Test item	Check	Remark	Result
Connect a mismatched dummy load with a VSWR of 3:1 to the VHF antenna terminal			
Continuation of Tx	Check that transmission continues		Ok
ALR output	Check that ALR sentence ID 002 is output at PI		Ok
MKD display	Check that the alarm is displayed on the MKD		Ok
Alarm relay	Check that alarm relay is activated		Ok
Send an ACK sentence	Check that alarm relay deactivated		Ok
	Check that ALR sentence is updated		Ok
	Check that alarm display on the MKD is updated	The MKD display is not updated. The alarm popup window is still displayed Retest 23.11.04 Ba: MKD display is updated, the alarm popup window is removed	
Generate a new alarm by connection the VHF antenna and again connect the mismatched dummy load			
Acknowledge the alarm on MKD (applies to all alarms) note: NEW	Check that alarm relay deactivated		Ok
	Check that ALR sentence is updated		Ok
	Check that alarm display on the MKD is updated (the alarm indication is cleared)		Ok
Connect VHF antenna	Check that ALR sentence is updated		Ok
	Check that alarm display on the MKD is updated	There was a test phase during which the MKD display was not updated. (See note) Retest 23.11.04 Ba: The problem could not be reproduced and was not be found during the remaining tests.	Ok

Note) In this state I could not remove the ALR 002 from the alarm list. It was displayed with state CV02. The button “Clear alarm” was displayed but pressing it did not remove the alarm.

After some repetions of the test the alarm could be removed by ackn of the alarm on MKD. This problem could some times reproduced by disconnection of antenna and connection of a 16 Ohm resistor (VSWR about 3:1). Then the transponder output an ALR with state V,V but MKD still displayed the alarm. Even after reconnection of the antenna the alarm on MKD was not removed.

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.

29.10.04 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		Ok
ALR output	Check that documentation describes that an ALR sentence with ID 003 (RX1), ID 004 (RX2) and ID 005 (DSC) is sent.		Ok

2.9.2.4 14.9.2.4 Loss of UTC

Method of measurement

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

Required result

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

25.06.04 Wa	Test details - UTC clock lost		
Test item	Check	Remark	Result
Disconnect GNSS antenna			
Continuation of operation	Check that transmission of position report continues		Ok
Synchronisation	Check that EUT switches to indirect synchronisation		Ok
TXT output	Check that a TXT sentence with ID 007 is output at PI	Not found Retest 03.09.04 Wa	 Ok
Alarm relay	Check that the alarm relay output is not activated		Ok
MKD display	Check that the status display of the MKD is updated	Not found Retest 03.09.04 Wa	 Ok

2.9.2.5 14.9.2.5 Remote MKD disconnection, when so configured

Method of measurement

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

a) Disconnect the connection to the remote MKD.

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

Required result

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

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

25.06.04 Wa	Test details - Remote MKD disconnection		
Test item	Check	Remark	Result
Disconnect the connection to the remote MKD.			
Continuation of Tx	Check that transmission continues		Ok
DTE flag	Check that the DTE flag in msg 5 is set to 1	Allways = 1 Retest 03.09.04 Wa	 Ok
ALR output	Check that ALR sentence ID 008 is output at PI	Not found Retest 03.09.04 Wa	 Ok
Alarm relay	Check that alarm relay is activated		Ok
MKD display	Check that loss of connection to the transponder is displayed on the MKD		Ok
Send an ACK sentence	Check that alarm relay deactivated		Ok
	Check that ALR sentence is updated		Ok
Reconnect MKD	Check that ALR sentence is updated		Ok
MKD display	Check that the MKD display is updated		Ok

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.

There are some problems with the GPS receiver which are described in this table.

Date	Result	Status
24.08.04	The internal GPS does not deliver SOG and COG when it works in differential mode. In normal mode it is ok. This is a problem of equipment 2 only. With equipment 1 it is ok. This problem causes some of the failures in the following test tables. Retest 28.10.04 Ba The problem has not been observed again	Ok
24.08.04	The EUT receives only a few msg 17 from the VDL tester. Msg 17 from another source are received without problems. It seems not to be a RF receiving problem because e.g. msg 5 which has a similar length is received without problems from the VDL tester. I provide a file with the same correction data from VDL tester and the other source, received both from another AIS transponder. File name: “Msg17_from_2_Tx.sst”. All other AIS transponders we have tested until now had problems receiving msg 17 from the VDL tester. Retest 28.10.04 Ba: no change, same problem Retest 10.11.04 Ba: Msg 17 is received reliably now, but the EUT does not set PA=1. I tried 2 different sources of correction data. An other transponder receiving the same msg 17 switched countinously to PA=1 This seems to be a common problem with direct RTCM data input. Retest 11.11.04 Ba: In an additional test with the second msg 17 transmitter which worked correctly in older versions the EUT also does not swich to PA=1 Retest 22.11.04 Ba: EUT sets PA = 1 with 2 different correction data sources and 2 different transmitters	Ok
24.08.04	Correction data are received rather unreliable at the RTCM (beacon) input (see attached 2 PI port log files) Retest 28.10.04 Ba: no change, same problem Retest 10.11.04 Ba: EUT does not switch to PA=1. In a pretest last week with a previous version it switched to PA=1. Retest 22.11.04 Ba: EUT switched to PA = 1. The reliability will be checked overnight Retest 23.11.04 Ba: A detailed evaluation of the nightly record showed that the EUT switches to PA = 0 in average two times in an hours for a short time Retest 24.11.04 Ba: Further evaluation showed that it is not a differential mode problem but the GPS outputs no position for about 40 s, and the transponder performs a new network entry	

	at that time. Retest 26.11.04 Ba: During a test overnight with MKD connected, but correction data applied by msg 17 there was no fail of position. So it seems the problem occurs only if correction data are applied directly to the RTCM input. Retest 03.12.04 Ba: During tests from 30.11.04 to 03.11.04 over night there was not fail of position	Ok
24.08.04	After applying correction data the internal GPS switches for about 20...25. s to the default position (91°, 181°) and then comes back with the valid position and PA=1. This problem is found on both units. (see log file of the beacon input problem). At the end of correction data there is no problem Retest 28.10.04 Ba EUT switches directly after about 30 s to the internal position, without intermediate output of default position	Ok

23.08.04	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		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 0		Ok
	Check that ALR message with ID 026 (No sensor position) is output on PI every 30 s		Ok
e) Change from f: • No external GNSS input • Activate internal GNSS	Check that internal position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is according to internal sensor (= 0)		Ok
	Check that msg 5 is output with new (internal) ref. point		Ok
	Check that ALR message with ID 026 is updated		Ok
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI	TXT ID 025 is output No output of TXT ID 028 Retest 14.09.05 Ba: Output of TXT ID 028 is ok	Ok Ok

	Check that the alarm on MKD according to ALR ID 026 is updated		Ok
	Check that status display of MKD is updated according to TXT ID 025 and ID 028	Position status is ok (internal GNSS), Speed/Course is displayed as “Not available”, Reason seems to be the missing TXT ID 028 sentence. Therefore it is not an MKD problem but an problem of the transponder <u>Retest 14.09.05 Ba:</u> Speed/Course is still displayed on MK as “Not available” . For the possible reason see note) The Speed and course value itself is correctly displayed <u>Retest 27.09.05 Ba:</u> Speed/course status is displayed “valid” It should display “internal” At start when TXT 28 is output it displays “internal” for a short time. After output of ALR 29/30 (inactive) it changes to “valid” but should continue displaying “internal” <u>Retest 29.10.04 Ba:</u> MKD status shows “Internal” now	Ok Ok
	Check that status has been changed after 30 s	Status is changed after 40 s, 10 s for the GPS receiver to find a fix and 30 s time-out.	Ok

d) Change from e: • Internal GNSS is available • Apply external GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0	Depending on the estimated error values of the GBS sentence	Ok
	Check that RAIM flag is according external sensor (=1)		Ok
	Check that msg 5 is output with new (external) ref. point		Ok
	Check that ALR message with ID 025 is updated		Ok
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI	Output of TXT ID 022 and 027***	Ok
	Check that the alarm on MKD according to ALR ID 025 is updated	No active alarm	Ok
	Check that status display of MKD is updated according to TXT ID 022 and ID 027	Position status is ok (external GNSS), Speed/Course was displayed for some time as “External”, then it changed to “Not available” (the external speed is used correctly) See note) <u>Retest 14.09.05 Ba:</u> No change <u>Retest 27.09.05 Ba:</u> Speed/course status is displayed “external”	Ok Ok
	Check that status has been changed after 30 s	Status is changed after 33 s	Ok

a) Change from d: • Internal GNSS • Change external mode to DGNSS	Check that external position is used	The EUT switches temporarily to the internal GPS and generates an "External EPFS lost" alarm Finally the external position is used. The EUT should change directly from the state "External GNSS" to "External DGNSS", not via the state "Internal GNSS". This alarm remains active, even when the EUT is using again the external position <u>Retest 14.09.05 Ba:</u> EUT changes directly to differential mode after 30s (according to TXT output). No ALR is generated. The PA-Flag is immediately changed to 1. It should be changed at the same tim e as the TXT ID 21 output (after 30 s) <u>Retest 27.09.05 Ba:</u> PA flag is changed at the time of TXT ID 21 output	Ok Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 021 is output on PI	After about 9 s the TXT ID 025 (Internal GNSS...) and TXT ID 028 Internal SOG/COG) is output. This is correct according to the actual (incorrectly) used source. After about 33 s there is an output of TXT ID 21 (and ID 27)	Ok

	Check that status display of MKD is updated according to TXT ID 021	Position status is ok (External DGNSS), Speed/Course is displayed - as internal, then - as external, then - not available see note) Retest 14.09.05 Ba: The speed status is always "Not available". The reason for the display change seems to be the changed TXT output of the transponder unit – no speed related TXT output Retest 27.09.05 Ba: Speed/course status is displayed "External"	Ok Ok
	Check that status has been changed after 30 s	The change of status to External DGNSS is done after 33 s	Ok
Highest Level: Changing downwards			
d) Change from a: • Internal GNSS available • Change external sensor mode to GNSS	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that TXT sentence with ID 022 is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
	Check that status has been changed after 5 s	Status is changed after 9 s	Acc
e) Change from d: • Internal GNSS available • Remove external GNSS input	Check that internal position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to documentation of internal GPS (=0)		Ok
	Check that msg 5 is output with new ref. point		Ok
	Check that ALR message with ID 025 (external EPFS lost) is output on PI		Ok
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI		Ok
	Check that an alarm according to ALR message is displayed on MKD		Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
	Check that status has been changed after 5 s	Status is changed after 9 s	acc
f) Change from e: • No external GNSS input • Disable internal GNSS	Check that default position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 0		Ok

	Check that ALR message with ID 026 (No sensor position) is output on PI		Ok
	Check that an alarm according to ALR message is displayed on MKD		Ok
	Check that status has been changed after 5 s	Status is changed after about 10 s	acc

Note)
It seems that the (incactive) ALR sentence 029/030 (No valid SOG/COG) causes the MKD to set the speed/course status to “Not available”.
It is correct and necessary to use the ALR 029/030 to set the speed/course status to “Not available”, but his should be done only if the ALR indicates an active alarm.

Retest 14.09.04 Ba: Could not be retested because internal GPS receiver did not switch to differential mode (tested with 2 different sources. Some problems receiving msg 17 but most of the msg 17 are received. Test was tried with a replacement unit
Retest 14.09.04 Ba: Retest could be done with the equipment no. 2

23.08.04 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: no RAIM, external: RAIM active.			
No correction data: Changing upwards			
d) Start with: • Internal GNSS is available • External GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 1		Ok
b) Change from d: • External mode is GNSS • Apply correction data by msg 17	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that RAIM flag is set according to internal GNSS (=0)		Ok
	Check that msg 5 is output with new (internal) ref. point		Ok
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Ok

	Check that status display of MKD is updated according to TXT ID 024 and 028	Position status is ok (Internal DGNSS (Msg 17)) Speed: same problem as described above Retest 15.09.04 Ba: No change Retest 29.09.05 Ba: Speed/course status is displayed “valid” It should display “internal” Retest 29.10.04 Ba: MKD status shows “Internal” now	Ok Ok
	Check that status is changed after 30 s		Ok
a) Change from b: • Change external mode to DGNSS • Internal DGNSS (msg 17)	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that RAIM flag is set according to external GNSS (=1)		Ok
	Check that msg 5 is output with new (external) ref. point		Ok
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 021 and ID 027	Position status is ok (External DGNSS) Speed: same problem as described above Retest 15.09.04 Ba: No change Retest 27.09.05 Ba: Speed/course status is displayed “External”	Ok Ok
	There is an incorrect alarm ID 025 External EPFS lost Retest 15.09.04 Ba: No ALR ID 025 output		Ok
	Check that status is changed after 30 s		Ok
Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by msg 17 • Change external sensor mode to GNSS	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Ok

	Check that status display of MKD is updated according to TXT sentences	Position status is ok (Internal DGNSS (Msg 17)) Speed: same problem as described above Retest 15.09.04 Ba: No change Retest 29.09.05 Ba: Speed/course status is displayed “valid”, not internal Retest 29.10.04 Ba: MKD status shows “Internal” now	Ok Ok
	Check that status is changed after 5 s	After about 10 s	acc
d) Change from c: • External GNSS input • Remove msg 17 (correction data for Internal GNSS)	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to external sensor input data		Ok
	Check that msg 5 is output with new ref. point		Ok
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Ok
	Check that status display of MKD is updated according to TXT sentence	Position status is ok (External GNSS) Speed: same problem as described above Retest 15.09.04 Ba: No change Retest 27.09.05 Ba: Speed/course status is displayed “External”	Ok Ok
	Check that status is changed after 5 s + max age of correction data	Status is changed after about 68 s. Max age seems to be 60 s	Ok

23.08.04 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: no RAIM, external: RAIM active.			
No correction data: Changing upwards			
d) Start with: • Internal GNSS is available • Exxternal GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 1		Ok
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (internal) ref. point		Ok
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI	Output of TXT ID 023 No output of TXT ID 028 The reason seems to be that the EUT does not switch to internal GPS speed because the speed form internal GPS is not available in differential mode. Retest 15.09.04 Ba: Output of TXT ID 028 ok	Ok Ok
	Check that status display of MKD is updated according to TXT ID 023 and 028		Ok
a) Change from C: • Change external mode to DGNSS • Internal DGNSS (beacon)	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (external) ref. point		Ok
	After about 8 s there is an incorrect output ALR ID 025 External EPFS lost. The alarm is inactivated when the external EPFS is reset to normal mode Retest 15.09.04 Ba: No ALR ID 025 output		Ok
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI	After about 20 s the EUT switches to the internal GNSS indicated by TXT ID 025 and 028. After about 30 s the EUT switches to external DGNSS indicated by TXT ID 021 and 027 Retest 15.09.04 Ba: EUT does not switch to internal GNSS temporarily	Ok Ok

	Check that status display of MKD is updated according to TXT ID 021		Ok
Status change time	Check that status is changed after 30 s		Ok
Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by beacon • Change external sensor mode to GNSS	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI	Output of TXT ID 023 TXT ID 028 is not output because EUT does not switch to internal speed Retest 15.09.04 Ba: Output of TXT ID 028 is ok, EUT switches to internal SOG/COG	Ok Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
d) Change from c: • External GNSS input • Remove beacon correction data for Internal GNSS	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to sensor input data		Ok
	Check that msg 5 is output with new ref. point		Ok
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI	Output of TXT ID 22 No output of TXT 027 because EUT was already on external speed Retest 15.09.04 Ba: Output of TXT ID 027 ok	Ok Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
Status change time	Check that status is changed after 5 s		Ok

23.08.04 Ba	Test details - Position priority –DGNSS test beacon + Msg 17		
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: no RAIM, external: RAIM active.			
No correction data: Changing upwards			
d) Start with: • Internal GNSS is available • Exxternal GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag = 1		Ok
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (internal) ref. point		Ok
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI	Output of TXT ID 023 TXT ID 028 is not output because EUT does not switch to internal speed Retest 15.09.04 Ba: Output of TXT ID 028 is ok, EUT switches to internal SOG/COG	Ok Ok
	Check that status display of MKD is updated according to TXT ID 023		Ok
b) Change from c: • External mode is GNSS • Correction data for DGNSS by beacon • Apply msg 17 with correction data	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 024 is output on PI	No output of TXT ID 024 Retest 15.09.04 Ba: Output of TXT ID 02 is ok,	Ok
	Check that status display of MKD is updated according to TXT ID 024	Because of the missing TXT ID 024 the MKD continues showing “Internal GNSS (beacon). This is a problem of the transponder, not the MKD Retest 15.09.04 Ba: MKD shows correctly “Internal DGNSS msg 17”	Ok
a) Change from b: • Change external mode to DGNSS • Internal DGNSS (msg17)	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (external) ref. point		Ok
	After about 8 s there is an incorrect output ALR ID 025 External EPFS lost. The alarm is inactivated when the external EPFS is reset to normal mode Retest 15.09.04 Ba: No ALR output ID 025		Ok

	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI	Output of TXT ID 022 No output of TXT 027 because EUT was already on external speed and did not switch speed (see above) Retest 15.09.04 Ba: Output of TXT ID 027 is ok,	Ok Ok
	Check that status display of MKD is updated according to TXT ID 021		Ok
Status change time	Check that status is changed after 30 s	Could not be completely checked because EUT did not switch to msg 17 Retest 15.09.04 Ba: Status time ok	 Ok

Highest Level: Changing downwards			
b) Change from a: • Msg 17 for internal DGNSS • Internal DGNSS by beacon • Change external sensor mode to GNSS	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI	Output of TXT ID 23 (internal DGNSS beacon) No TXT ID 028 output Retest 15.09.04 Ba: Output of TXT ID 024 and ID 028 is ok,	Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
c) Change from b: • External sensor mode is GNSS • Internal DGNSS by beacon • Stop msg 17	Check that internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that TXT sentence with ID 023 is output on PI	No TXT output because TXT ID 23 has already been output at b) Retest 15.09.04 Ba: Output of TXT ID 023 is ok,	Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
d) Change from c: • External GNSS input • Remove beacon correction data for internal GNSS	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to sensor input data		Ok
	Check that msg 5 is output with new ref. point		Ok
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI	Output of TXT ID 022 ok No output of TXT ID 027 because speed was all the time from external GNSS Retest 15.09.04 Ba: Output of TXT ID 027 is ok	Ok Ok
	Check that status display of MKD is updated according to TXT sentence		Ok
Status change time	Check that status is changed after 5 s	Could not be completely checked because EUT did not switch to msg 17 Retest 15.09.04 Ba: Output of TXT ID 028 is ok, EUT switches to internal SOG/COG Retest 15.09.04 Ba: Assuming a max age of correction data = 50 s the status change time is ok.	Ok

2.9.3.2 14.9.4 Heading sensor

(6.10.3.1)

Method of measurement

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

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

b) Reconnect the inputs for HDG and ROT

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

d) Reconnect the ROT input

Required Result

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

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

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

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

03.09.04 Wa	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		Ok
	Check that alarm relay is inactive		Ok
	Check that no ALR output is active		Ok
a) Disconnect heading and ROT • No heading • No ROT	Check that heading in VDL = default		Ok
	Check that ROT in VDL = default		Ok
	Check that ALR message with ID 032 (heading invalid) is output on PI		Ok
	Check that ALR message with ID 035 (ROT invalid) is output on PI		Ok
	Check that alarm relay is active		Ok
	Check that an alarm according to ID 032 is displayed on MKD		Ok

	Check that an alarm according to ID 035 is displayed on MKD		Ok
b) Reconnect heading and ROT • Valid heading • Valid ROT	Check that heading in VDL ok		Ok
	Check that ROT in VDL ok		Ok
	Check that ALR message with ID 032 (heading valid) and status V is output on PI		Ok
	Check that ALR message with ID 035 (ROT valid) and status V is output on PI		Ok
	Check that TXT message with ID 031 (Heading valid) is output on PI		Ok
	Check that TXT message with ID 033 (ROT in use) is output on PI		Ok
	Check that alarm relay is inactive	Still active Retest 16.09.04 wa	Ok
	Check that the alarm display on MKD is updated		Ok
	Check that the status display on MKD is updated (heading and ROT valid)		Ok
c) Change ROT talker • Valid heading • ROT, talker not TI	Check that ROT in VDL is + 127 for ROT > 10 °/min, turning right	Real ROT value is used Retest 16.09.04 Wa Calculation from HDT value	Ok
	Check that ROT in VDL is + 127 for ROT < -10 °/min, turning left	Real ROT value is used Retest 16.09.04 Wa Calculation from HDT value	Ok
	Check that TXT message with ID 034 (other ROT in use) is output on PI	Not found Retest 16.09.04 Wa Retest 22.10.04 Wa Not found Retest 29.10.04 Ba No output of TXT 034 Retest 09.11.04 Ba: TXT output ID 034 ok	Ok
	Check that the status display on MKD is updated (other ROT)	Not found Retest 16.09.04 Wa Indication as VALID ROT indicator Retest 22.10.04 Wa Not change Retest 29.10.04 Ba: No display on MKD (because of missing TXT ID 034) Retest 09.11.04 Ba: Display of ROT status (other ROT) is ok	Ok

d) Change ROT talker to TI • Valid heading • ROT, talker TI	Check that ROT in VDL ok		Ok
	Check that TXT message with ID 033 (ROT in use) is output on PI	Not found Retest 16.09.04 Wa	Ok
	Check that the status display on MKD is updated (ROT in use)		Ok
a) Disconnect ROT • Valid heading • No ROT Change heading > 5 °/30s	Check that ROT in VDL is + 127 for increasing heading	EUT doesn't use HDT for ROT calculation Retest 29.10.04 Ba: EUT does calculate ROT from Heading, value ok	Ok
	Check that ROT in VDL is - 127 for decreasing heading	Retest 29.10.04 Ba: EUT does calculate ROT from Heading, value ok	Ok
	Check that TXT message with ID 034 (other ROT in use) is output on PI	Retest 29.10.04 Ba: No output of TXT ID 034 Retest 09.11.04 Ba: TXT output ID 034 ok	
b) Reconnect ROT • Valid heading • Valid ROT from TI	Check that ROT in VDL ok		Ok
	Check that TXT message with ID 033 (ROT in use) is output on PI		Ok

2.9.3.3 14.9.5 Speed sensors

(6.10.3.3)

Method of measurement

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

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

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

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

Required Result

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

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

03.09.04 Wa	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		Ok
	Check that COG = default		Ok
	Check that alarm relay is active		Ok
	Check that the status according to ALR msg ID 029/30 is displayed on MKD		Ok
b) Activate internal GPS • Internal position • Internal speed	Check that SOG from internal GPS is used in VDL message 1,2,3		Ok
	Check that COG from internal GPS is used in VDL message 1,2,3		Ok
	Check that TXT message with ID 028 (internal speed in use) is output on PI		Ok
	Check that ALR message with ID 29 and 30 (No valid SOG/COG information) with status V is output on PI		Ok
	Check that alarm relay is inactive	Still active Retest 16.09.04 Wa	Ok
	Check that the status according to TXT 28 is updated on MKD (internal SOG/COG in use	COG/SOG in status display indicated as “not avalable” Retest 16.09.04 Wa No change Retest 22.10.04 Wa	Ok
	Check that the alarm ID 29/30 is deleted from MKD		Ok
c) Connect external speed • No external Position • External speed	Check that SOG from internal Sensor is used in VDL message 1,2,3		Ok
	Check that COG from internal Sensor is used in VDL message 1,2,3		Ok
d) Connect position (and speed) • External Position • External speed	Check that SOG from external Sensor is used in VDL message 1,2,3		Ok
	Check that COG from external Sensor is used in VDL message 1,2,3		Ok
	Check that TXT message with ID 027 (external COG/SOG in use) is output on PI		Ok
	Check that the status according to TXT msg ID 027 is displayed on MKD (external COG/SOG in use)		Ok
Changing downwards			
c) Disconnect external position • No external Position • External speed	Check that SOG from internal GPS is used in VDL message 1,2,3		Ok

	Check that COG from internal GPS is used in VDL message 1,2,3		Ok
	Check that TXT message with ID 028 (internal speed in use) is output on PI		Ok
	Check that the status according to TXT msg ID 028 is displayed on MKD (internal COG/SOG in use)	COG/SOG in status display indicated as “not avaiable” Retest 16.09.04 Wa No change Retest 22.10.04 Wa	 Wa
b) Disconnect external speed • No external Position • No external speed	Check that SOG from internal GPS is used in VDL message 1,2,3		Ok
	Check that COG from internal GPS is used in VDL message 1,2,3		Ok
a) Disable internal GPS • No external Position • No external speed • No internal Position • No internal speed	Check that SOG = default		Ok
	Check that COG = default		Ok
	Check that ALR message with ID 029 (No valid SOG information) is output on PI		Ok
	Check that ALR message with ID 030 (No valid COG information) is output on PI		Ok
	Check that alarm relay is active		Ok
	Check that the status according to ALR msg ID 029/30 is displayed on MKD		Ok

2.10 14.10 Display and control

(6.11)

General MKD related problems			
Date	Item	Remark	Result
25.08.04 Ba	Target time-outs	The lost target time-outs of the transponder and MKD seem to use different values. In some cases a target was displayed on the MKD but not counted in the number of received stations of the transponder, in another case the number of received stations was 0 but the MKD still displayed one or 2 targets which had been switched of some time before. If have not yet measured the lost target time-out times but it seems to be rather long. It would be nice if we could get the lost target time-out values. Otherwise it takes much time to get it by testing. A lead for the time-out values could be the following table, but I personally think the time-out should not be reduced below 30 or 60 s in case of high speed ships. Retest 29.10.04 Ba A timeout of 3 and 6 minutes depending on movement and nav status is used	Ok
09.11.04 Ba	MKD black screen	A few minutes after start of the system I pressed 2 times the “enter” key to acknowledge alarms and then got a black sreen, but still illuminated The transponder outputs an alarm 008 MKD connection lost Could not be reproduced in a repetition of this procedure Retest 23.11.04 Ba: This problem has not been found again with newer software versions.	Ok
10.11.04 Ba	MKD inoperable	When pressing the left or right button on several screens with lists (e.g. thel alarm list or the Security log screen) the MKD becomes inoperable. It does not react on any button pressing. The MKD connection lost alarm from the transponder is not active. Retest 22.11.04 Ba: The left or right button does not stop MKD operation	Ok
22.11.04 Ba	MKD alarm	The “External EPFS lost” alarm ID 25 is displayed on the MKD in the popup window with the test “Lost transceiver connection”. • If the alarm list is displayed the popup window shows the correct test. • In the alarm list the correct alarm is displayed • Other alarms seem to have the same problem Retest 25.11.04 Ba:	

		All alarms checked: Popup alarm and TXT messages are displayed correctly	Ok

Table 2 AIS Reporting Rates

Extracted from:
Part 5:Guidelines for the use and display of AIS information on radar

Category of Ship	Nominal Reporting Interval Class A	Lost Target maximum interval class A	Nominal reporting interval Class B	lost target maximum interval class B
Ship at anchor or moored and not moving faster than 3 knots (class B not moving faster than 2 knots)	3 min	18 min	3 min	18 min
Ship at anchor or moored and moving at more than 3 knots	10 s	60 s	N/A	N/A
Ship 0 - 14 knots (class B 2 – 14 knots)	10s	60 s	30	180 s
Ship 0 – 14 knots and changing course	3 1/3 s	60 s		
Ship 14 – 23 knots	6 s	36 s	15 s	90 s
Ship 14 - 23 knots and changing course	2 s	36 s		
Ship > 23 knots	2 s	12 s	5 s	30 s
Ship > 23 knots and changing course	2 s	12 s		

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

25.06.04 Wa	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		Ok
	Check that range and bearing of AIS targets can be displayed without horizontal scrolling	Range bearing not displayed Retest 3.09.04 Wa	Ok

25.06.04 Wa	Test details b) - MKD display of received messages		
Test item	Check	Remark	Result
Receive messages and check display of data			
MSG 1,2,3 Display of dynamic ship data - required -	Check that received target is displayed		Ok
	MMSI	Recommended	Ok
	Position (RNG, BRG); Detailed check of values in next table	Required Not displayed in actual version Retest 03.09.04 Wa	 Ok
	Position (Lat,Lon)	Recommended	Ok
	Time	Not required	--
	PA (Position accuracy) flag	Not required	--
	SOG and COG	Recommended	Ok
	True heading	Recommended	--
	Navigational status	Recommended	--
	RAIM flag	Not required	--
MSG 5 Display of static and voyage related ship data - required -	MMSI	recommended	Ok
	IMO number	Not required	Ok
	Call sign	Recommended	Ok
	Name of ship	Required	Ok
	Type of ship and cargo	Recommended	Ok
	Dimension/Reference for position	Length recommended	--
	Type of EPFD	Not required	--
	Estimated time of arrival	Not required	Ok
	Maximum present static draught	Not required	Ok
	Destination	Not required	Ok
	DTE flag	Not required	--
MSG 4 Base station report - Recommended -	MMSI	Test 15.09.04 Ba: Recommended	Ok
	Position (Lat,Lon)	recommended	Ok
	Position (RNG, BRG); Check values	recommended	Ok
	Time	Not required	---
	PA flag	Not required	---
	RAIM flag	Not required	---
MSG 9 SAR aircraft position report - optional -	MMSI	Test 15.09.04 Ba: Recommended	Ok
	Position (RNG, BRG); Check values	Recommended	Ok
	Position (Lat,Lon)	Recommended	Ok
	Time	Not required	---
	PA flag	Not required	---

	SOG and COG	Recommended COG is ok, SOG is displayed only if the speed is < 103 kn Retest 28.10.04 Ba: MKD now shows 10000 for a speed of 1000 kn Retest 29.10.04 Ba: Display of SOG is ok now	Ok Ok
	RAIM flag	Not required	---
	DTE flag	Not required	---
MSG 12/14 Safety related text message - Required -	MMSI	Required Message handling not implemented Retest 03.09.04 Wa Pop up window with ship name displayed	Ok
	Text content	Required Not found Retest 25.10.04 Wa Decoding of Msg text on MKD fails : HALLO displayed as HALLOC 29.10.04 Wa: The text "HALLO" is displayed correctly	Ok
	Broadcast or selective	Recommended Not found	Acc.
MSG 18,19 Class B position report - required -	MMSI	Test 15.09.04 Ba: Required	Ok
	Position (RNG, BRG); Check values	Required	Ok
	Position (Lat,Lon)	Recommended	Ok
	Time	Not required	---
	PA flag	Not required	---
	SOG and COG	Recommended	Ok
	True heading	Recommended	Ok
	RAIM flag	Not required	---
	Name	Recommended,	Ok
	Type of ship and cargo	Recommended	Ok
	Dimension/Reference for position	Length recommended	---
	Type of EPFD	Not required	---
	DTE flag	Not required	---
MSG 21 Aids to navigation report ~~- recommended -~~	MMSI	Test 15.09.04 Ba: Recommended	Ok
	Type of Aids to navigation	Recommended	---

	Name of Aids to navigation	Recommended	Ok
	Position (RNG, BRG); Check values	Recommended	---
	Position (Lat,Lon)	Lat is displayed incorrectly, Lon is not displayed Retest 28.10.04 Ba: Lat and lon are ok	Ok
	PA flag	Not required	---
	RAIM flag	Not required	---
	Virtual/Pseudo AtoN flag	Recommended	---
	Dimension/Reference for position	Length recommended	---
	Type of EPFD	Not required	---
	Off position indicator	Recommended	---
	The time-out of the AtoN is about 2 s. This is to short Retest 29.10.04 Ba: Time-out of AtoN is ok		Ok
	The NavStatus is displayed as “Underway using engine”, but this value is not included in the message 21. This applies also to other types of targets Retest 28.10.04 Ba: NavStatus is changed to “not specified”		Ok
	SOG, COG are not displayed or show default values	Displayed “----“	Ok
Means to select messages	Check that means to select received messages are available	Not implemented Retest 25.10.04 Wa	Ok
Means to select data fields	Check that means to select data fields are available	Not implemented Retest 25.10.04 Wa	Ok

Date	Result	Status
25.08.04	In a test with 60 targets (10 % channel load) the MKD is nearly unusable in the “mode Targets”. In the other modes operation is ok. - The reaction time is very high – several seconds - Several range and bearing values are not calculated (“----“) - The target list is not correctly sorted by range - Range and bearing seem not to be correct, has to be tested in extra test Retest 29.10.04 Ba: Update of range and bearing is still too slow Retest 10.11.04 Ba: Range and bearing are updated within 2 s after receiving a position report (tested with about 50 targets)	Ok
26.08.04	There was a phase in which position from the internal and external source was not displayed on the MKD. The speed display was ok, and the position was correctly used for transmissions and PI output (VDO). After setting the external position source to differential mode ithe position was displayed again correctly on the MKD, also for normal mode and internal GPS. This problem could not yet be reproduced. Retest 10.11.04 Ba: This problem has not been observed in all following test phases. It seems to be solved in the newer software versions	Ok
10.11.04 Ba	With a large number of targets it is very inconvenient to select a target on a very different place in the list. It is necessary to move slowly through all list items. We recommend to use the left and right arrow buttons to move page by page through the list.	rec
10.11.04 Ba	With a significant number of targets the redraw of the plot screen becomes rather slow. We recomment to stop the redraw immediately when during redraw the Pan, Scan or Scale is changed and to start new redraw with the changed parameters. Otherwise changing these parameters for more than 1 step is very slow.	rec
03.09.04 Wa	Range / Bearing test becasue of the poor performance not possible Retest 16.09.04 Wa	Ok

03.09.04 Wa	Test details – Range and bearing values		
Test item	Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data			
Own ship position on standard position in NE quadrant			
Target in NE direction	Check range		Ok
	Check bearing		Ok
Target in N direction	Check range		Ok
	Check bearing		Ok
Target in NW direction	Check range		Ok
	Check bearing		Ok
Target in W direction	Check range		Ok
	Check bearing		Ok
Target in SW direction	Check range		Ok
	Check bearing		Ok
Target in S direction	Check range		Ok
	Check bearing		Ok
Target in SE direction	Check range		Ok
	Check bearing		Ok
Target in E direction	Check range		Ok
	Check bearing		Ok
Own ship position on a position near Lon. of 180°			
Target on same side of 180 °	Check range		Ok
	Check bearing		Ok
Target on the other side of 180°	Check range		Ok
	Check bearing		Ok
Own ship position on a position near Lat of 0°			
Target on same side of 0 °	Check range		Ok
	Check bearing		Ok
Target on the other side of 0°	Check range		Ok
	Check bearing		Ok

25.06.04 Wa	Test details – Display of own ship position		
Test item	Check	Remark	Result
Internal Position	Check that the own ship position is displayed continously		Ok
	Describe how it is displayed (in which menu/screen) and how this screen is activated	On screen upper left corner	Ok
	Check that the actual source is indicated (external/internal)	Not found Retest 03.09.04 Wa	Ok
External Position	Check that the own ship position is displayed continously		Ok
	Check that the actual source is indicated (external/internal)	Not found Retest 03.09.04 Wa	Ok

25.06.04 Wa	Test details d) – Input of data		
Test item	Check	Remark	Result
MMSI number	Check that number can be input		Ok
	Check that input is protected		Ok
IMO number	Check that number can be input		Ok
	Check that input is protected		Ok
Call sign	Check that Call sign can be input		Ok
	Check that input is protected		Ok
Name of ship	Check that name can be input		Ok
	Check that input is protected		Ok
Navigational status	Check that data can be input		Ok
	Check if input by number or by selection of items	By selection list	Ok
Type of ship and cargo	Check that data can be input	Retest 12.07.04 Ba: Type of ship is not accepted/stored by transponder Retest 03.09.04 Wa	Ok
	Check if input by number or by selection of items	By selection list	Ok
Dimension/Reference for position	Check that data for internal GPS antenna position can be input		Ok
	Check that data for external EPFSD position can be input		Ok
Maximum static draught	Check that data can be input		Ok
Destination	Check that name of destination can be input		Ok
	Check that estimated time of arrival can be input		Ok

2.10.2 14.10.2 Initiate message transmission

Method of measurement

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

Required results

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

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

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

2.10.3 14.10.3 System control

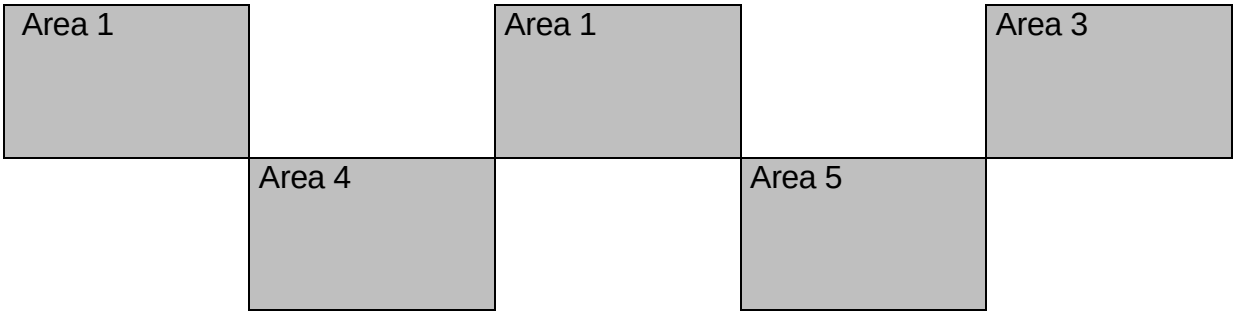
Method of measurement

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

Required results

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

Date	Result	Status
22.10.04 Wa	still problems with changed areas : are not displayed at old area entry, it is necessary to leave the menu and by the next selection the area is found at the expected entry. 29.10.04 Wa: no change Retest 10.11.04 Ba: no change 23.11.04 Ba: After saving the changed area the same area is still/again displayed on MKD (but with a different entry number). After going around through the different setup mode screens the same area is displayed again, this time with the old entry number.	acc
25.10.04 Wa	In case of failed area input a popup or similar message is missing : 29.10.04 Wa: There are TXT msg from the transponder but they are not displayed on the MKD Retest 10.11.04 Ba: In case of a rejected region there is a popup window now indicating the reason why it is rejected.	Ok
29.10.04	A change of the SW corner of Area 1 (in the picture below) is not accepted (from 51°00 51°05). There is a TXT output from transponder that there are too many corners within a range of 8 Nm Retest 10.11.04 Ba: Change of area is accepted now	Ok


Area 1
Area 1
Area 3
Area 4
Area 5

25.10.04 Wa	Test details - Regional area entry		
Test item	Check	Remark	Result
Presentation of the existing areas	Check that the 8 existing areas can be selected and displayed		Ok
	Check display of Channel A and B		Ok
	Check display of RX/TX mode		Ok
	Check display transmission power		Ok
	Check display of bandwidth		Ok
	Check display of NE point of area		Ok
	Check display of SW point of area		Ok
	Check display of transitional zone		
Entry of a new area	Check selection between changing an existing area and creating a new regional area entry		Ok
	Check input of Channel A and B		Ok
	Check input of RX/TX mode		Ok
	Check input transmission power		Ok
	Check input of NE point of area		Ok
	Check input of SW point of area		Ok
	Check input of transitional zone		Ok
	Check that the user has to confirm a second time that the new data shall be stored		Ok
Enter invalid channel	Check that entry is refused		Ok
Enter too small area (<20 nm)	Check that entry is refused	<u>Retest 10.11.04 Ba:</u> Entry is refused, but the display is “Area setting too large”. Tested area: NE: 51°02 / 009° SW: 51°00 / 008° If the area is too large it is correctly displayed <u>Retest 23.11.04 Ba:</u> Now “Area setting to small” is displayed	Ok Ok
Enter too large area (> 200 nm)	Check that entry is refused		Ok
Enter a region according to M.1371-1 A2/4.1 figure 4.1.5A (4 adjacent areas)	Check that entry is refused		Ok
Changing an existing area	Check that existing area for changes can be selected		Ok
	Check change of Channel A and B		Ok
	Check change of RX/TX mode		Ok
	Check change transmission power		Ok

	Check change of NE point of area	Retest 10.11.04 Ba Changing the NE point of an existing area is refused with "Area setting corner conflict" Tested areas (e.g.): NE:55°/10°30 SW:53°/09°30 NE changed to 54° NE:52°/15° SW:51°/14° NE changed to 52°30/15° Retest 23.11.04 Ba: Changes are accepted and stored	Ok
	Check change of SW point of area	Retest 10.11.04 Ba: Same problem as with NE point: Tested area: NE:52°/15° SW:51°/14° SW changed to 50°30/14° Retest 23.11.04 Ba: Changes are accepted and stored	Ok
	Check change of transitional zone		Ok
	Check that the user has to confirm a second time that the new data shall be stored		Ok
Changing of default values	Check change of Channel A and B	Not possible	Ok
	Check change of RX/TX mode	Not possible	Ok
	Check change transmission power	Not possible	Ok

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

If 2 password are used (installation, administrator or level 1 password and operation, user or level 2 password), data which may be change during normal operation should be protected by the level 1 password.

Note):
There are 4 password levels:

- User
- Operator
- Service
- Engineering

28.10.04 Ba	Test details - Password protection			
Input item	Level one requirement	Level 2 Recommendation	Implemented type of protection	Result
Static data				
MMSI	Required	---	Service	Ok
IMO-Number	Required	---	Service	Ok
Call sign	Recommended	Recommended if not level 1	Service	Ok
Name	Recommended	Recommended if not level 1	Service	Ok
Dimension/Reference for position	Required	---	Service	Ok
Type of ship	Recommended		Service	Ok
Tx off switching	Required, if function available	---	The Service password is required to enable the silent mode function. The user password is used to activate/inactivate the silent mode	Ok
Voyage data				
Navigational status	Not allowed	Not recommended	User	Ok
Type of cargo	Not allowed	Not recommended	User	Ok
Destination	Not allowed	Not recommended	User	Ok
ETA	Not allowed	Not recommended	User	Ok
Maximum static draught	Not allowed	Not recommended	User	Ok
Persons on board	Not allowed	Not recommended	User	Ok
Other operational data				
Area settings	Not allowed	Recommended	Operator	Ok
Message transmission	Not allowed	Recommended	Not protected	Ok
Long range confirmation	Not allowed	Not recommended	Not protected	Ok
Configuration data				
Serial port settings (Baudrate, ...)	Required	---	Service	Ok
Long range autoackn.	Not required	Recommended	Service	Ok

Note) If only a single password is used this password should only be used for settings which are done at installation time.
It should not be used for settings which are part of the normal operation of the AIS. If it is also used for operational items the navigators have to know it, and therefore there is no real protection of the installation values like MMSI ...

If operational items should be protected (like channel management) a second (Operator or User) password should be used.

29.10.04 Ba	Test details - Alarms and status display			
ID	Test item	Check	Remark	Result
001	Tx malfunction	Check is done in 2.9.2.1	Checked by documentation	Ok
002	Antenna VSWR exceeds limit	Check is done in 2.9.2.2		Ok
003	Rx cannel 1 malfunction	Check documentation		Ok
004	Rx cannel 2 malfunction	Check documentation		Ok
005	Rx cannel 70 malfunction	Check documentation		Ok
006	General AIS failure	Check documentation	Only output to indicate that there is no alarm active (always with the "V" status)	Ok
008	MKD connection lost	Check is done in 2.9.2.5		Ok
025	External EPFS lost	Check is done in 2.9.3.1		Ok
029	No valid SOG information	Check is done in 2.9.3.3		Ok
030	No valid COG information	Check is done in 2.9.3.3		Ok
032	Heading lost/invalid	Check is done in 2.9.3.2		Ok
035	No valid ROT information	Check is done in 2.9.3.2		Ok

	Test details - Status display			
ID	Test item	Check	Remark	Result
007	UTC clock lost			Ok
021	External DGNSS in use	Check is done in 2.9.3.1		Ok
022	External GNSS in use	Check is done in 2.9.3.1		Ok
023	Internal DGNSS in use (beacon)	Check is done in 2.9.3.1		Ok
024	Internal DGNSS in use (msg 17)	Check is done in 2.9.3.1		Ok
025	internal GNSS in use	Check is done in 2.9.3.1		Ok
027	External SOG/COG in use	Check is done in 2.9.3.3		Ok
028	Internal SOG/COG in use	Check is done in 2.9.3.3		Ok
031	Heading valid	Check is done in 2.9.3.2		Ok
033	Rate of Turn indicator in use	Check is done in 2.9.3.2		Ok
034	Other ROT source in use	Check is done in 2.9.3.2		Ok
036	Channel management parameters changed	Check that status change is displayed if channel management parameters are changed.		Ok

2.10.4 Ergonomic aspects

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

Topic	Description
25.06.04 Wa	Cursor style is not useful for editing Retest 10.11.04 Ba: Cursor/Selection indication ok

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

07.05.04 Ba	Test details - TDMA Syncronisation		
Test item	Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn			
• Operate with GPS	Check that sync state is 0 (UTD direct)		Ok
	Check that report rate is 10 s		Ok
• Disable GPS by disconnection of GPS antenna, • at least one other AIS transponder with UTC direct	Check that sync state is 1 (UTC indirect		Ok
	Check that report rate is 10 s		Ok
• GPS disabled • Remove other AIS	Check that sync state is 3 (no UTC source)	Sync mode is 3 • Reporting rate = 2 s (Semaphore mode) See note 1 • Slot allocation is not ok See Note 2) Retest 03.06.04 Ba: Reporting rate remained at 10 s. The item 2 (Slot allocation) could not be checked because there was no rescheduling	Ok Ok

• GPS disabled, • One base station with UTC direct within range	Check that sync state is 1 (UTC indirect)		Ok
	Check that report rate is 10 s		Ok
• GPS disabled • Remove Base station	Check that sync state is 3 (no UTC source)	Sync mode is ok but again in semaphore mode like above Retest 03.06.04 Ba: Reporting rate remained at 10 s.	Ok Ok

Note 1) EUT increases the reporting rate to 2 s which indicates that it is in semaphore mode. The semaphore mode is incorrect in this situation because there is no other transponder requiring synchronisation (in mode 3).

At the beginning of this phase there was another AIS target stored but this was in sync mode 0 and therefore did not need synchronisation. Evaluation of PI log showed that there is no other VDM during this phase.

After a restart under this condition the EUT does not enter semaphore mode.

Note 2) The slot allocation in this semaphore mode is not ok.
The rescheduling and the first 7 minutes of the semaphore mode are ok. Then there are more and more slot allocations very much outside the selection interval. The slot offset values at 2 s reporting rate should be in the range of 2250 +/- 30 = 2220 ... 2280.
A number of the slot offsets are clearly in this range, but there is an increasing number fo allocations with very different values, down to 1339 (see related Excel sheet).

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.

07.05.04 Ba	Test details - TDMA Syncronisation		
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 • Other Transponders all without GPS, • Semaphore 1)	Check that sync state is 3		Ok

	Check that report rate is 2 s	No semaphore mode, because the Number of received stations is set to 0, On the other transponder it is correctly set to 1, therefore the EUT doesn't become semaphore. <u>Retest 03.06.04 Ba:</u> Number of received stations is still incorrect. Therefore the retest is not performed. <u>Retest 12.07.04 Ba:</u> Number of received stations is still incorrect (always 0 – tested with 1 and 2 other staions). Therefore the retest is not performed. <u>Retest 25.08.04 Ba:</u> Reporting rate is 2 s	Ok

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

4.1.3 16.1.3 Synchronisation test without UTC

(M.1371 A1/3.1.1)

Method of measurement

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

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

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

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

Check CommState Parameter SyncState in position Report and reporting rate.

Required results

a) Transmitted Communication state shall fit the Synchronisation mod

b) Transmitted Communication state shall fit the Synchronisation mod

d) Synchronisation mode shall revert to UTC direct

07.05.04 Ba	Test details - TDMA Syncronisation		
Test item	Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn			
• Disable GPS, • One base station without GPS within range	Check that sync state is 2 (Base station indirect)		Ok
	Check that report rate is 10 s	A rescheduling is performed after start of msg 4.	Ok
• GPS disabled • Remove Base station	Check that sync state is 3 (no UTC source)		Ok
• Operate without GPS • Other Transponders all without GPS, • Not semaphore 1)	Check that sync state is 3		Ok
	Check that report rate is 10 s		Ok
• Enable GPS • Other Transponders all without GPS,	Check that sync state is 0		Ok
	Check that report rate is 10 s		Ok

4.2 16.2 Time division (Frame format)

(M.1371 A1/3.1.2)

Method of measurement

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

Required results

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

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

4.3 16.3 Synchronisation jitter

(M.1371 A1/3.2.2.8.4)

Definition

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

Method of measurement

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

a) UTC direct synchronisation

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

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

Repeat the test for 12.5 kHz bandwidth.

Required results

The synchronisation jitter shall not exceed

a) ±104 µs using UTC direct synchronisation

b) ±312 µs using UTC indirect synchronisation .

07.05.04 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)	There is a delay of T2 of about 60 µs, but it is within the limits of +/- 108 µs	Ok
UTC indirect	Check that T2 is in the range of +/- 0.312 ms compared to the T2 value of the sync source The measured value of the VDL analyser (in units of 10 µs) should be in the range of +/- 31 of the measured values of the sync source		Ok

4.4 16.4 Data encoding (bit stuffing)

Method of measuremen*t

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

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

4.5 16.5 Frame check sequence

(M.1371 A1/3.2.3)

Method of measurement

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

Required results

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

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

4.6 16.6 Slot allocation (Channel access protocols)

(M.1371 A1/3.3.1)

4.6.1 16.6.1 Network entry

Method of measurement

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

Required results

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

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.

05.04.04 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			
Initial message type	Check that the network entry is done with msg 3		Ok
Keep flag	Check that the keep flag is set in msg 3		Ok
Slot offsets	Check that the slot offsets of msg 3 are in the range 750 +/- 75= 675 ... 825		Ok
Slot use	Check that the allocated slots are used in the next frame		Ok
Message type	Check that the message type is changed to 1 after initial frame		Ok
Timeout	Check that the time-out in the 2nd frame is between 2 and 6 (decremented from initial 3..7)		Ok

05.04.04 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	Record: 05.04. 13:18	Ok
Slot offsets	Check that the slot offsets of msg 3 are in the range 450 +/- 45 = 405....495		Ok
Supply external speed data of 25 kn Switch on EUT and record data with VDL analyser.			
Initial reporting rate	Check that the EUT performs network entry with a reporting rate of 2 s	Record: 05.04. 13:22 and 13:34	Ok
Slot offsets	Check that the slot offsets of msg 3 are in the range 150 +/- 15 = 135...165		Ok

4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)

(M.1371 A1/3.3.2)

Method of measurement

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

Required results

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

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

CommState sub message	Check that for time-out 3,5,7 the number of received stations is indicated	Retest 03.06.04 Ba: Number of received stations is 0, but VDM shows correctly that one another AIS is received received, and MKD indicated 1 target. When the sync mode changed to 1 the number of received station changed to 11, in another test it was set to 10 in sync mode 3 when no other station was received Retest 03.06.04 Ba: Number of received stations is still incorrect (always 0) Retest 25.08.04 Ba: Number of received stations is ok (testet with 1, 2 and 61 stations)	Ok
	Check that for time-out 2,4,6 the slot number is indicated		Ok
	Check that for time-out 1 the correct value of UTC is indicated		Ok
	Check that for time-out 0 the slot increment is indicated		Ok
Alternating channels	Check that the position reports are transmitted on alternating channels		Ok
Msg 5	Check that the channel alternating of position report is not impaired by msg 5		Ok
Others	Check the recorded data for other possibly incorrect items	No other problems found	Ok

Date	Result	Status
10.11.04	About 30 min after starting the unit I found that the slot allocation was incorrect. During a recording time of 24 min all slot offset values of msg 1 at time-out 0 were incorrect. The values are in the range of 750 and 1500 instead of 2250. This results in uncorrect transmission timing (see Excel sheet). The beginning of this phase was not recorded because the recording was not yet started at that time. It may be that the problem existed since startup.	
11.11.04	The same or a similar problem occurred during a overnight test from 10.10.04 15:00 to 11.11.04 09:00 when the unit was restartet. In this test not all but a certain number of slot offset values at time-out 0 was in the ranges 0, 750 and 1500 instead of 2250.	
22.11.04	Retest 22.11.04 Ba: An offset value of 17 has been sent. The slot usage is according to an slot offset of 2250 + 17 = 2267. In the msg the value 2267 has to be used Retest 24.11.04 Ba: In the overnight log there were about 10 similar occurences. Retest 26.11.04 Ba: In the overnight log there was no invalid value. One invalid value in the diagram could clearly identified as a logging error	Ok

4.6.3 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.

14.06.04 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		Ok
90 % channel load Generate channel load as described below 1).	Check that msg 8 is transmitted within 4 s	BBM – Tx times (s): 12-14, 19-22, 26-27, 36-39, 49-52, 58-59	Ok

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

4.6.4 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.

4.6.4.1 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.

06.04.04	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		Ok
Offset value = 1000 (> 600 msg/10 min	Check that the reporting rate is 600/10min = 60/min = 1s		Ok
Send a msg 16 rate assignment with EUT as second transponder in the message			
Dest. A: rate = 600 msg/10min Dest. B: rate = 120 msg/10min	Check that the EUT does reschedule to the assigned reporting rate of 120 msg/10 min = 12 msg/min = 5s		Ok

Note) It seems that the EUT tries to use the reporting rate of 600/10min, but in the first 2 frames it is partly transmitting on channel 1 only, in the 3rd frame it is completely transmitting on channel A only. The channel B slots are correctly released.
After the 3rd frame the unit

4.6.4.2 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).

06.04.04 Ba	Test details a)– Slot offset and increment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset A = offset to first assigned slot = 40 and slot increment parameter = 4 (increment = 125) Within the time-out time repeat the message 16 Record VDL messages and evaluate record			
VDM output	Check VDM output of msg 16		Ok
First message	Check that first message is sent after 40 slots		Ok
Message type	Check that message type of position report is 2		Ok
Initialisation phase	Check that EUT starts immediately (after offset slots) with message 2		Ok
Deallocation of previously used slots	Check that the slot used before assignment are deallocated using timeout value = 0 and slot offset = 0		Ok
Alternating channels	Check that position report is sent alternating on channel A and B		Ok
Increment	Check that the increment is 125 slots		Ok
Timeout	Check that all slots of the first msg2 frame have the same timeout		Ok
	Check that the timeout is between 3 and 7	Time-out is 5	Ok
	Check that the timeout is decremented after 1 min		Ok
Comstate	Check that the ComState is like the ComState of msg 1		Ok
Switch back to autonomous mode	Check that the EUT deallocates all msg 2 slots with timeout 0	Slots are not deallocated Retest 03.06.04 Ba: All Slots are release, except the first one which is used to start the rescheduling	Ok
	Check that the EUT changes slots with timeout 0 on each channel to ITDMA slot msg 3 to start autonomous mode	No rescheduling, EUT keeps reporting rate of assigned mode Retest 03.06.04 Ba: ok	Ok
	Check that EUT initialises autonomous mode like network entry	No rescheduling, EUT keeps reporting rate of assigned mode Retest 03.06.04 Ba: ok	Ok
Other problems	In line 8 of the Excel table there is a msg 2 in slot 1 which does not make sense. This slot was not used in the previous frames, was not allocated and is also not used in the following frames. Retest 03.06.04 Ba: No incorrect messages found		Ok

Msg type	The msg type of the time-out 0 frame should be 2 instead of 1 because this frame is still part of the assigned mode and the msg are using assigned mode slots. Retest 03.06.04 Ba: Msg type in the frame with time-out 0 is 2	Ok
Remark	The assigned mode is started with a normal reschaduling using msg 3. This is ok but not requiered because in slot assignement the slots are reserved for this station.	Ok
Channel usage	Because the two receivers of the EUT are both set to channel A the slot assignement command is received on both channels. Therefore it cannot be checked if the right channels are used for the assigned mode. Therefore this test has to be repeated when Rx channel setting is ok Retest 03.06.04 Ba: The assignment command was transmitted on channel B but received on channel A (according to VDM). The assigned mode started on channel A, according to the receiving channel from EUT view. This has to be rechecked the Rx channel handling is ok. Retest 25.08.04 Ba: Channel usage is ok, Msg 16 on channel A, First transmission on channel A	Ok

06.04.04 Ba	Test details b)– Rate assignment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset=reporting rate of 300msg/10 min, increment=0 Within the timeout time repeat the message 16 Record VDL messages and evaluate record			
VDM output	Check VDM output of msg 16		Ok
Initialisation phase	Check that EUT starts immediately with rescheduling to the new reporting rate		Ok
Message type	Check that message type of position report is 2 instead of msg 1		Ok
Reporting rate	Check that the reporting is 300 msg/10 min = 30msg/frame = 2 s		Ok
Alternating channels	Check that position report is sent alternating on channel A and B		Ok
Initialisation	Check that the Initialisation is according to changing reporting rate using msg 3 to allocate new slots		Ok
Timeout	Check that the assigned timeout is between 2 and 6	Time-out is 5	Ok
Assignment repetition	Check that the timeout is extended by repetition of msg 16: Switch back is between 3 and 7 minutes after last repetition	Has to be tested when EUT reverts to normal reporting rate at the end of assigned mode. Retest 03.06.04 Ba: Could not be retested because only 2 of 11 msg 16 have been received. Retest 25.08.04 Ba: End of assigned mode: 7 min after last reveived msg 16	Ok
Switch back to autonomous mode	Check that the EUT reverts to normal reporting rate between 4 and 8 minutes after last msg 16	EUT does not revert to the normal reporting rate but keeps the assigned reporting rate Retest 03.05.04 Ba: EUT reverts to 10 s reporting rate	Ok

4.6.4.3 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.

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

4.6.4.4 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.

17.06.04 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)		Ok
Slot use	Check that slots assigned by the msg 16 are used by the EUT		Ok

4.6.5 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.

17.06.04 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 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	Generally the reserved slots are not used The EUT immediately stops transmission on the reserved slots. It should force the time-out of the Tx in reserved slots to 0 and reselect the slots in these SI in the next frame. Retest 12.07.04 Ba: No change, Tx on reserved slots is immediately stopped, without releasing or rescheduling to free slots. In the next frame there are transmissions in these selection intervals, but without allocation be msg 1 or 3. --- In the 3. Frame after the last msg 20 reserved slots are already used. It seems that the time-out is evaluated 1 frame to early Retest 12.07.04 Ba: Time-out is ok now Retest 13.09.04 Ba: Time-out on reserved channels is forced to 0 and free slots are allocated.	Ok Ok

End of reservation	Check that after end of reservation all slots are used again.		Ok
Other channel	Check that the reserved slots are also not used on the other channel because of priority rufles	On the other channel in 11 of 19 reselection a reserved slot is used (50% of all slots are reserved) See note) Retest 12.07.04 Ba On the other channel only unreserved slots are used	Ok

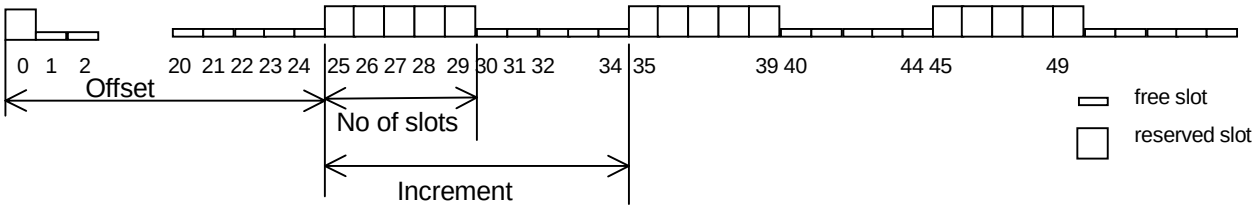
Note) According to ITU-R M1371, §4.4.1 and clarification 2.56 a slot reserved by a base station on the other channel has got the lowest possible priority, that means it can be used for candidate slots, but only if no other slot with higher priority is available.

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



4.7 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.

04.06.04 Ba	Test details – Content of msg 1,2,3 Position report		
Test item	Check	Remark	Result
Transmit a message 1,2 or 3 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
Repeat indicator	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
Navigational status	Check the field content		Ok
Rate of Turn	Check the field content		Ok
SOG	Check the field content		Ok
Position accuracy flag	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
COG	Check the field content		Ok
True heading	Check the field content		Ok
Time stamp	Check the field content		Ok
RAIM flag	Check the field content		Ok
Communication state	Check the field content		
	The communication state is checked in 4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)		

04.06.04 Ba	Test details – Content of msg 4 Base station report		
Test item	Check	Remark	Result
Transmit a msg 4 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
UTC year, month, day, hour, minute, second	Check the field content		Ok
Position accuracy flag	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
Type of EPFD	Check the field content		Ok
RAIM flag	Check the field content		Ok
Communication state	Check the field content		
	The communication state is checked in 4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)		

04.06.04 Ba	Test details – Content of msg 5 Static data		
Test item	Check	Remark	Result
Transmit a message 5 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 2		Ok
Check sentence number	Check that value = 1,2		Ok
Sequential message ident.	Check that counting from 0...9 modulo 10	Is not counting up but changing randomly: Recorded numbers in this order: 4,8,4,7,4,1,5 Retest 12.07.04 Ba Sequential message identifier is counting correctly now	Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2		Ok
Message ID	Check the field content		Ok
MMSI	Check the field content		Ok
AIS version indicator	Check the field content		Ok
IMO number	Check the field content		Ok
Call sign	Check the field content		Ok
Name of ship	Check the field content		Ok
Type of ship and cargo type	Check the field content		Ok
Reference point A,B,C,D	Check the field content		Ok
Type of EPFS	Check the field content		Ok
ETA	Check the field content		Ok
Maximum present static draught	Check the field content		Ok
Destination	Check the field content		Ok
DTE flag	Check the field content		Ok

04.06.04 Ba	Test details – Content of msg 6 Addressed binary message		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2 (msg length = 112 bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Sequence number	Check the field content		Ok
Destination ID (MMSI)	Check the field content		Ok
Retransmit flag	Check the field content		Ok
DAC	Check the field content		Ok
FI	Check the field content		Ok
Binary data	Check the field content		Ok

04.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID 1 (MMSI)	Check the field content		Ok
Sequence number 1	Check the field content		Ok
Destination ID 2 (MMSI)	Check the field content		Ok
Sequence number 2	Check the field content		Ok
Destination ID 3 (MMSI)	Check the field content		Ok
Sequence number 3	Check the field content		Ok
Destination ID 4 (MMSI)	Check the field content		Ok
Sequence number 4	Check the field content		Ok

	The EUT stops PI output when receiving a msg 7 and own MMSI as Destination ID 4. I could repeat it several times. Retest 12.07.04 Ba: No stop of PI output		Ok

04.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 4 (msg length = 80 bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
DAC	Check the field content		Ok
FI	Check the field content		Ok
Binary data	Check the field content		Ok

04.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
Repeat indicator	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
Altitude	Check the field content		Ok
SOG	Check the field content		Ok
Position accuracy flag	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
COG	Check the field content		Ok
Time stamp	Check the field content		Ok
DTE flag	Check the field content		Ok
RAIM flag	Check the field content		Ok
Communication state			
Sync state	Check the field content		Ok
Slot time-out	Check the field content		Ok
Submessage: received stations	Check the field content		Ok
Submessage: Slot number	Check the field content		Ok
Submessage: UTC	Check the field content		Ok
Submessage: Slot offset	Check the field content		Ok

04.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID 1 (MMSI)	Check the field content		Ok
			Ok
Msg11 response	Check for response with msg 11 if EUT is addressed		Ok
Msg11 response	No response if addressed to other station		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
UTC year, month, day, hour, minute, second	Check the field content		Ok
Position accuracy flag	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
Type of EPFD	Check the field content		Ok
RAIM flag	Check the field content		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0 (msg length = 138 bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Sequence number	Check the field content		Ok
Destination ID (MMSI)	Check the field content		Ok
Retransmit flag	Check the field content		Ok
Safety related text	Check the field content		Ok
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		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID 1 (MMSI)	Check the field content		Ok
Sequence number 1	Check the field content		Ok
Destination ID 2 (MMSI)	Check the field content		Ok
Sequence number 2	Check the field content		Ok
Destination ID 3 (MMSI)	Check the field content		Ok
Sequence number 3	Check the field content		Ok
Destination ID 4 (MMSI)	Check the field content		Ok
Sequence number 4	Check the field content		Ok
	The EUT stops PI output when receiving a msg 13 and own MMSI as Destination ID 4. I could repeat it several times. Retest 12.07.04 Ba: No stop of PI output		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0 (length = 144 bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Safety related text	Check the field content		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID 1 (MMSI)	Check the field content		Ok
Message ID 1.1	Check the field content		Ok
Slot offset 1.1	Check the field content		Ok
Message ID 1.2	Check the field content		Ok
Slot offset 1.2	Check the field content		Ok
Destination ID 2 (MMSI)	Check the field content		Ok
Message ID 2.1	Check the field content		Ok
Slot offset 2.1	Check the field content		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0 (msg length = 96 bit (1 dest.)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID A (MMSI)	Check the field content		Ok
Offset A	Check the field content		Ok
Increment A	Check the field content		Ok
Destination ID B (MMSI)	Check the field content		Ok
Offset B	Check the field content		Ok
Increment B	Check the field content		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0 (msg length = 192 bit)		Ok
Message id	Check the field content		Ok
Skource ID (MMSI)	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
Message type	Check the field content		Ok
StationId	Check the field content		Ok
Zcount	Check the field content		Ok
Sequence number	Check the field content		Ok
N	Check the field content		Ok
Health	Check the field content		Ok
Correction data	Check the field content		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
SOG	Check the field content		Ok
Position accuracy flag	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
COG	Check the field content		Ok
True Heading	Check the field content		Ok
Time stamp	Check the field content		Ok
Assigned mode flag	Check the field content		Ok
RAIM flag	Check the field content		Ok
CommState selector	Check the field content		Ok
Communication state - Selector = 0 (SOTDMA)			
Sync state	Check the field content		Ok
Slot time-out	Check the field content		Ok
Submessage: received stations	Check the field content		Ok
Submessage: Slot number	Check the field content		Ok
Submessage: UTC	Check the field content		Ok
Submessage: Slot offset	Check the field content		Ok
Communication state - Selector = 1 (ITDMA)			
Sync state	Check the field content		Ok
Slot increment	Check the field content		Ok
Number of slots	Check the field content		Ok
Keep flag	Check the field content		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
SOG	Check the field content		Ok
Position accuracy flag	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
COG	Check the field content		Ok
True Heading	Check the field content		Ok
Time stamp	Check the field content		Ok
Name of ship	Check the field content		Ok
Type of ship and cargo	Check the field content		Ok
Dimension of ship/Refpoint A,B,C,D	Check the field content		Ok
Type of EPFD	Check the field content		Ok
RAIM flag	Check the field content		Ok
DTE flag	Check the field content		Ok
Assigned mode flag	Check the field content		Ok

05.06.04 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	The msg 20 is not received correctly. There is an empty VDM output: !AIVDM,,A,, at msg 20 with 4 entries and !AIVDM,,A,D at msg 20 with 1 entry Retest 12.07.04 Ba: VDM of msg 20 ok now, tested with 1 and 4 entries	Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2 (msg length = 160 bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Offset number 1	Check the field content		Ok
Number of slots 1	Check the field content		Ok
Time-out 1	Check the field content		Ok
Increment 1	Check the field content		Ok
Offset number 2	Check the field content		Ok
Number of slots 2	Check the field content		Ok
Time-out 2	Check the field content		Ok
Increment 2	Check the field content		Ok
Offset number 3	Check the field content		Ok
Number of slots 3	Check the field content		Ok
Time-out 3	Check the field content		Ok
Increment 3	Check the field content		Ok
Offset number 4	Check the field content		Ok
Number of slots 4	Check the field content		Ok
Time-out 4	Check the field content		Ok
Increment 4	Check the field content		Ok

05.06.04 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	Number of sentences is 2 Retest 12.07.04 Ba: Number of sentences = 1	Ok
Check sentence number	Check that value = 1	Sentence number is 1, 2 The second sentence is empty, the encapsulated data field is empty. In this case there should be output only 1 sentence Retest 12.07.04 Ba: 1 VDM sentence now, sentence number = 1, the encapsulated data field is empty. Retest 18.08.04 Ba: The encapsulated data field is correct again	Ok Ok Ok
Sequential message ident.	Check that field is empty (NULL)	The Identifier is not counting up but seems to be randomly selected. Recorded values: 0,6,5,5,6,5,3,8 Retest 12.07.04 Ba: Sequential message ident field is empty, accoding to Number of sentence = 1	Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
Type of aids to navigation	Check the field content		Ok
Name of aids to navigation	Check the field content		Ok
Position accuracy flag	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
Dimension of ship/Refpoint A,B,C,D	Check the field content		Ok
Type of EPFD	Check the field content		Ok
Time stamp	Check the field content		Ok
Off position indicator	Check the field content		Ok
RAIM flag	Check the field content		Ok
Virtual/Pseudo AtoN flag	Check the field content		Ok
Assigned mode flag	Check the field content		Ok
Name of AtoN extension	Check the field content		Ok

05.06.04 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		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
Channel A	Check the field content		Ok
Channel B	Check the field content		Ok
Tx/Rx mode	Check the field content		Ok
Power flag	Check the field content		Ok
Area addressed			
Longitude of NE corner	Check the field content		Ok
Latitude of NE corner	Check the field content		Ok
Longitude of SW corner	Check the field content		Ok
Latitude of SW corner	Check the field content		Ok
Addressed or broadcast flag	Check that flag = 0		Ok
Selective addressed			
Station ID 1 (MMSI)	Check the field content		Ok
Station ID 2 (MMSI)	Check the field content		Ok
Addressed or broadcast flag	Check that flag = 1		Ok
Channel A bandwidth	Check the field content		Ok
Channel B bandwidth	Check the field content		Ok
Transitional zone	Check the field content		Ok

Message content result overview

The PI output results are an overview of the above tables of the various received messages. Response results can be derived from other tests as mentioned in the “response result” column

Message type	PI out Yes/no	PI output Result	Response required (in addition to PI output)	Response result
Msg1,2,3	Yes	Ok	No	
Msg 4	Yes	Ok	No	
Msg 5	Yes	Ok	No	
Msg 6	Yes	Ok	Tx of ackn. msg 7	(6.1.2)
Msg 7	Yes	Ok	ABK output, no further repetitions	(2.1.4.1)
Msg 8	Yes	Ok	No	
Msg 9	Yes	Ok	No	
Msg 10	Yes	Ok	Tx of msg 11 UTC/date response	Ok
Msg 11	Yes	Ok	No	
Msg 12	Yes	Ok	Tx of ackn. msg 13, Display on MKD	(6.2)
Msg 13	Yes	Ok	ABK output, no further repetitions	(2.1.4.1)
Msg 14	Yes	Ok	Display on MKD	(2.10.1)
Msg 15	Yes	Ok	Tx of requested message 3, 5	(6.3)
Msg 16	Yes	Ok	Change of TDMA mode, position report using msg 2	(4.6.4)
Msg 17	Yes	Ok	Internal GNSS receiver shall switch to differential mode	Ok
Msg 18	Yes	Ok	No	
Msg 19	Yes	Ok	No	
Msg 20	Yes	Ok	Has to avoid using reserved slots	4.6.5
Msg 21	Yes	Ok	no	
Msg 22	Yes	Ok	Addition of new area to the regional area table	5.2

4.7.2 16.7.2 Transmitted messages

(M.1371 A1/3.3.7)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of messages relevant for a mobile station according to Table 7 by the EUT.

Record transmitted messages.

Required results

Confirm that EUT transmits messages with correct field contents and format or responses as appropriate. Confirm that messages 4, 9,16, 17, 18, 19, 20, 21, 22 are NOT being transmitted by the EUT.

The message contents are checked using the VDL analyser

03.06.04 Ba	Test details – Message 1,2,3 Position report		
Test item	Check	Remark	Result
The message content of message 1,2,3 is checked in 2.3.1 Information content of msg 1			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
	Check that the channel field is empty (NULL) if not TX		Ok
Fill bits	Check that value = 0		Ok

03.06.04 Ba	Test details – Message 5 Static data		
Test item	Check	Remark	Result
The message content of message 5 is checked in 2.3.2 Information content of msg 5.			
Number of sentences	Check that value = 2		Ok
Check sentence number	Check that value = 1,2		Ok
Sequential message ident.	Check that counting from 0...9 modulo 10	EUT is counting up 1,3,5,7, should cound 1,2,3,4,... Retest 12.07.04 Ba: There is a common counter for VDM and VDO.	Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2		Ok

03.06.04 Ba	Test details – Content of msg 6 Addressed binary message		
Test item	Check	Remark	Result
This test can be done in combination with test 2.1.4.1 14.1.4.1 Transmit an addressed message Apply PI sentence: File AIABM_bin.sst Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2 (msg length = 112 bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Sequence number	Check the field content		Ok
Destination ID (MMSI)	Check the field content		Ok
Retransmit flag	Check the field content		Ok
DAC	Check the field content		Ok
FI	Check the field content		Ok
Binary data	Check the field content		Ok

03.06.04 Ba	Test details – Content of msg 7 Binary acknowledge		
Test item	Check	Remark	Result
This test can be done in combination with test 6.1.2 18.1.2 Acknowledgement Message 6 has to be transmitted by other AIS or VDL generator Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID 1 (MMSI)	Check the field content		Ok
Sequence number 1	Check the field content		Ok
Destination ID 2 (MMSI)	Omitted		
Sequence number 2	Omitted		
Destination ID 3 (MMSI)	Omitted		
Sequence number 3	Omitted		
Destination ID 4 (MMSI)	Omitted		
Sequence number 4	Omitted		

03.06.04 Ba	Test details – Content of msg 8 Binary broadcast message		
Test item	Check	Remark	Result
This test can be done in combination with 6.4 18.3 Broadcast messages Apply PI sentence: File AIBBM_bin.sst Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 4 (msg length = 80 bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
DAC	Check the field content		Ok
FI	Check the field content		Ok
Binary data	Check the field content		Ok

03.06.04 Ba	Test details – Content of msg 10 UTC and date inquiry		
Test item	Check	Remark	Result
activate transmission of msg 10 if implemented (not required)			
		Not implemented	Ok

03.06.04 Ba	Test details – Content of msg 11 UTC date response		
Test item	Check	Remark	Result
Transmit a msg 10 from VDL generator to request transmission of msg 11 by EUT Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message id	Check the field content		Ok
User ID (MMSI)	Check the field content		Ok
UTC year, month, day, hour, minute, second	Check the field content		Ok
Position accuracy flag	Check the field content		Ok
Longitude	Check the field content		Ok
Latitude	Check the field content		Ok
Type of EPFD	Check the field content		Ok
RAIM flag	Check the field content		Ok

03.06.04 Ba	Test details – Content of msg 12 Addressed safety related message		
Test item	Check	Remark	Result
This test can be done in combination with test 2.1.4.1 14.1.4.1 Transmit an addressed message Apply PI sentence: File AIABM_safety.sst Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0 (msg length = 96bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Sequence number	Check the field content		Ok
Destination ID (MMSI)	Check the field content		Ok
Retransmit flag	Check the field content		Ok
Safety related text	Check the field content		Ok

03.06.04 Ba	Test details – Content of msg 13 Safety related acknowledge		
Test item	Check	Remark	Result
This test can be done in combination with test 6.1.2 18.1.2 Acknowledgement Send message 12 from other transponder or VDL generator Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID 1 (MMSI)	Check the field content		Ok
Sequence number 1	Check the field content		Ok
Destination ID 2 (MMSI)	Ommitted		
Sequence number 2	Ommitted		
Destination ID 3 (MMSI)	Ommitted		
Sequence number 3	Ommitted		
Destination ID 4 (MMSI)	Ommitted		
Sequence number 4	Ommitted		

03.06.04 Ba	Test details – Content of msg 14 Safety related broadcast message		
Test item	Check	Remark	Result
This test can be done in combination with 6.4 18.3 Broadcast messages Apply PI sentence: File AIBBM_safety..sst Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2 (length = 64 bit)		Ok
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Safety related text	Check the field content		Ok

03.06.04 Ba	Test details – Content of msg 15 Interrogation		
Test item	Check	Remark	Result
This test can be done in combination with 6.3 18.2 (M.1371 A1/5.3) Interrogation responses Apply PI sentence: File AIAIR_35_5_bin.sst Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Ok
Check sentence number	Check that value = 1		Ok
Sequential message ident.	Check that field is empty (NULL)		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2 (msg length = 160 bit)	Msg lenght = 88 bit	OK
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID 1 (MMSI)	Check the field content		Ok
Message ID 1.1	Check the field content		Ok
Slot offset 1.1	Check the field content = 0		Ok
Message ID 1.2	Check the field content		Ok
Slot offset 1.2	Check the field content = 0		Ok
Destination ID 2 (MMSI)	Check the field content	Msg with a second destination is not transmitted, ABK output: $AIABK,,A,015,,2 Retest 12.07.04 Ba: No transmission, ABK with incorrect MMSI field: $AIABK,000000006,,15,8,2 Retest 18.08.04 Ba: Msg 15 with 2 destinations is transmitted now. Remark: Msg 15 is transmitted only if the position report of at least one destination is received by the EUT. If only 1 of the 2 destinations is received by the EUT only this destination is included in the msg 15.	Ok acc
Message ID 2.1	Check the field content	Retest 18.08.04 Ba:	Ok
Slot offset 2.1	Check the field content = 0	Retest 18.08.04 Ba:	Ok

5 17 Specific tests of Network Layer

(7.4)

5.1 17.1 Dual channel operation

(M.1371 A1/4.1)

5.1.1 17.1.1 Alternate transmissions

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode on default channels AIS1, AIS2. Record transmitted scheduled position reports on both channels. Check CommState for slot allocation.

Required results

Confirm that EUT allocates slots in both channels alternating. Repeat check for data link access period.

05.06.04 Ba	Test details – Alternate transmissions		
Test item	Check	Remark	Result
Set-up EUT in autonomous mode, set report rate to 10sec with external sensor input. Record transmitted scheduled position reports on both channels. Check Comm State for slot allocation.			
Alternate transmissions	Check that the EUT transmission is alternating		Ok
Comm state	Check that the slots of each channel are allocated on the same channel		Ok
Same test on network entry (data link access period)			
Alternate transmissions	Check that the EUT transmission is alternating		Ok
Comm state	Check that the slots of each channel are allocated on the same channel		Ok

5.2 17.2 Regional area designation by VDL message

(M.1371 A1/4.1))

Method of measurement

Set-u p standard test environment and operate EUT in autonomous mode. Apply Channel management messages (msg 22) to the VDL defining two adjacent regional areas 1 and 2 with different channel assignments for both regions and a transitional zone extending 4nm either side of the regional boundary. At least one channel shall be 12.5kHz channel. Let the EUT approach region 1 from outside region 2 more than 5 nm away from region boundary transmitting on default channels. Record transmitted messages on all 6 channels.

Region	*Primary channel*	*Secondary channel*
Region 1	*CH A1*	*CH B1*
Region 2	*CH A2*	*CH B2*
Default region	*AIS 1*	*AIS 2*

Required results

Check that the EUT transmits and receives on the primary channels assigned for each region alternating channels and doubling reporting rate when passing through the transitional zones. EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

Item	*Area*	*Channels in use*
1	*default region*	*AIS1, AIS2*
2	*first transitional zone*	*AIS1, CH A 2*
3	*region 2*	*CH A 2, CH B 2*
4	*second transitional zone*	*CH A 2, CH A 1*
5	*region 1*	*CH A 1, CH B 1*

This Test is devided in 2 parts:

- The first part checks the general behaviour including check of ACA and TXT output, check of the borders of area an transitional zone, check of the correct frequency use.
- The second part concentrates on the slot allocation and use during a transition from one area (high sea) into another.

Date	Remark	Status
07.04.04 Ba	The Rx behaviour was not really clear. During one move the EUT did receive only on 1 channel. After moving back 1 zone it was receiving on both channels. This has to be verified and checked more detailed Retest 10.05.04 Ba: A check with different area setting gave the results as listed in the table below Retest 18.06.04 Ba: Rx channel usage when moving through the areas is still not ok, see table below Retest 19.08.04 Ba: Rx channel usage when moving through the areas is ok now (except the problem in the TZ zone to another area, but this seems not to be a problem of channel usage but of TZ size handling – will be handled there)	Ok
07.04.04 Ba	When starting the EUT within an area both receivers are set to the channel B Retest 03.05.04 Ba: Not changed Retest 18.06.04 Ba: Rx channels are ok now	Ok
10.05.04 Ba	ACA output. The Lat/Lon fields of the area corner points in ACA output are empty (Area applied by ACA sentence) Retest 18.06.04 Ba: Lat/Lon fields are ok now	Ok
18.06.04 Ba	A longer record inside a Transitional zone showed that the reporting rates or better the slot usage is rather irregular. There are some SI without transmission, other transmissions are nearly at the same time. (See excel sheet) Retest 20.08.04 Ba: no improvement Retest 03.09.04 Ba: slot allocation and usage is ok now.	Ok
19.08.04 Ba	When moving the position inside the TZ of an area (but not inside the area) and then moving back out of the TZ the EUT does not recognize this and continues the Tx/Rx scheme of the TZ (moving more than 20 min outside the area and waiting about 8 min). Retest 03.09.04 Ba: When moving out of the TZ the EUT uses the high sea settings again.	Ok

VDO/M	Set (ACA)	MKD tx	Tx result	MKD Rx	Rx result
A B	2086 2084	161925 (2086) 159025 (----)	2086 2084	161925 (2086) 161825 (2084)	2088 2086
A B	2084 2086	161825 (2084) 159025 (----)	2084 2086	161825 (2084) 161925 (2086)	2086 2084 note)
A B	2060 2082	160625 (2060) 159025 (----)	2060 2062	161925 (2060) 161825 (2062)	2062 not 2060,2062, not 2087,2088
A B	2087 2088	159025 (---) 159025 (---)	2087 2088	161975 (2087) 162025 (2088)	Not 2087,2088 Not 2087,2088

Note) Another transponder transmitting on 2084 with – 30 dBm was received on channel 2084. After reduction of level to – 60 dBm it was not received on 2084.

<u>Retest 18.06.04 Ba</u> Check of Rx channels

Test channels: Area 1: 1061, 2061
Area 2: 1062, 2062

Position	**Rx A Std**	**Rx A (VDM A)**	**Rx B Std**	**Rx B (VDM B)**
High sea	AIS1	**AIS1**	AIS2	**AIS2**
TZ high sea to area 2, outside area	AIS1	**AIS2**	A2	**AIS2**
TZ high sea to area 2, inside area	A2	**AIS2**	AIS1	**AIS2**
Inside area 2	A2	**AIS2**	B2	**B2**
TZ area 2 to area 1, in area 2	A2	**AIS2**	A1	**B1**
TZ area 2 to area 1, in area 1	A1	**AIS2**	A2	**B1**
Inside area 1	A1	**B1**	B1	**A1**

If the EUT is directly put into an area or if it is switched on inside an area the usage of the channels is ok

Retest 19.08.04 Ba Check of Tx/Rx channels

Test channels: Area 1: A1 = 1061, B1 = 2061
Area 2: A2 = 1062, B2 = 2062

Position	Tx A	Tx B	Rx A	Rx B
High sea	AIS1	AIS2	AIS1	AIS2
TZ high sea to area 2, outside area	AIS1	A2	AIS1	A2
TZ high sea to area 2, inside area	A2	AIS1	A2	AIS1
Inside area 2	A2	B2	A2	B2
TZ area 2 to area 1, in area 2	A2	A1	A2	A1
TZ area 2 to area 1, in area 1	A1	A2	A1	A2
Inside area 1	A1	B1	A1	B1
TZ high sea to area 1, inside area	A1	AIS1	A1	AIS1
TZ high sea to area 1, outside area	AIS1	A1	AIS1	A1
High sea	AIS1	AIS2	AIS1	AIS2

06.04.04 Ba	Test details part 1 – Channel management by VDL msg 22		
Test item	Check	Remark	Result
Set-up EUT in autonomous mode transmitting on channel AIS1/AIS2, send 2 Msg 22 by VDL generator, defining 2 adjacent areas with channels A1, B1 and A2, B2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 4nm. Set the position outside the areas. "TZ" is used for "transitional zone" Set the positions near the limits of the transitional zones to check the dimensions			
PI output	Check that the msg 22 are output on PI		Ok
Display of defined area	Check that the defined area is correctly stored (displayed on MKD)	Could not yet be checked because no MKD available and request on PI by AIxxQ,ACA is not implemented Retest 05.06.05 Ba: Checked by Q,ACA request	Ok
	Check ACA and TXT output on PI (not required but recommended.		Ok
	ACA: check in use flag and time of in use flag		Ok
Item 1: In high sea area	Check that channels AIS1 and AIS2 are in use	Retest 05.06.04 Ba: Tx ok, No Rx on AIS1 and AIS2 Retest 19.08.04 Ba: Tx ok, Rx ok	Ok
Item 2: Move position into outer TZ of region 2	Check ACA and TXT output (No required)	No ACA and TXT output	Ok
	If ACA output: check in use flags and time of in use flag		---

	Check the limit of the TZ (5 Nm = 8.8 minutes)	The limit of TZ is between 4.5 and 5.5 min It seems that a size of 5 min is used instead of 5 Nm (= 8.8 min at the actual latitude) Retest 15.06.04 Ba: The border is between 6.5 and 7.5. It seems that a TZ size of 4 nm = 7 min is used, as defined for the TZ inside the area. For the TZ outside the area the default TZ of 5 nm should be used. Retest 03.09.04 Ba Border of TZ is between 8.9 and 8.8 min	Ok
	Check that channel AIS 1 and A2 are used	AIS1 and A2 are used for TX	Ok
	Check that reporting rate is doubled		Ok
Item 3: Move position into inner TZ of region 2 (crossing the area border)	Check ACA and TXT output (Required)	No output Retest 15.06.04 Ba: No change Retest 19.08.04 Ba: Output of ACA and TXT Remark: there is a delay of about 30 s after crossing the border The TZ size in the ACA output is 3, the same value as in msg 22. The TZ size is defined as the value of msg 22 + 1 (see ITU-R M1371 §3.3.8.2.18 msg 22) Retest 19.08.04 Ba: No change Retest 03.09.04 Ba TZ size in the ACA output is 4 as required	Ok Ok
	ACA: check in use flag = 1		Ok
	ACA: check time of in use flag		Ok
	Check the border of area	Test 19.08.04 Ba:	Ok

Item 4: Move position into region 2 (out of TZ)	Check ACA and TXT output (not required)	TXT and ACA output The TZ size in the ACA output is 3, the same value as in msg 22. The TZ size is defined as the value of msg 22 + 1 (see ITU-R M1371 §3.3.8.2.18 msg 22) Retest 19.08.04 Ba: No change Retest 03.09.04 Ba TZ size in the ACA output is 4 as required	Ok
	Check the limit of the TZ (4 nm = 7 minutes)	The border is between 9 and 9.5 min, should be at 7 minutes = 4 Nm Retest 19.08.04 Ba: No change Retest 03.09.04 Ba Border of TZ is between 7.0 and 7.1 from border of area	Ok
	Check that channel A2 and B2 are used	The channels A and B are used for transmission - but A and B in PI output are reversed Retest 19.08.04 Ba: Tx: A=A2, B=B2 Rx: A=A2, B=B2	Ok
	Check that reporting rate is changed back to normal reporting rate		Ok
Item 5: Move position into TZ between region 1 and 2, inside area 2	Check that channels A2 and A1 are used	In TZ size 1: A = A1, B= A2 are used Between TZ size 1 and TZ size 2: A2 and AIS1 are used for TX Retest 19.08.04 Ba: Same as before, more detailed: Within TZ size 1: Tx: A=A2, B= A1 Rx: A=A2, B= A1 Between TZ size 2 and TZ size 1: Tx: A = A2, B = AIS1 Rx: A = A2, B = AIS1 Retest 03.09.04 Ba At 7.7 minutes from area border A2 and B2 are used for Tx and Rx	Ok

	Check the limit of the TZ (4 nm = 7 minutes)	TZ size 1: between 4.5 and 5.0 min TZ size 2: between 9 and 9.5 min <u>Retest 19.08.04 Ba:</u> TZ border 2: no change, between 9 and 9.5 min, should be at 7 min. TZ border 2: changed, now between 6.5 to 7.5 <u>Retest 03.09.04 Ba</u> Border of TZ is between 7.0 and 7.1 from border of area	Ok
	Check that reporting rate is doubled		Ok
<u>Item 6:</u> Move position into area 1 (inside the TZ) (crossing the area border)	Check ACA and TXT output (Required)	<u>Retest 19.08.04 Ba:</u> ACA output	Ok
	Check the border of area	Could not be checked because there is no ACA output and no change of channel usage <u>Test 19.08.04 Ba:</u>	Ok
<u>Item 7:</u> Move position into region 1 (out of TZ)	Check that channels A1 and B1 are used	A1 and B1 are used for Tx Tx and Rx: A=A1, B= B1	Ok
	Check the limit of the TZ (4 nm = 7 minutes)	TZ size is between 4.5 and 5.0 minutes, should be 7 minutes <u>Retest 03.09.04 Ba</u> Border of TZ is between 7.0 and 7.1 from border of area	Ok
	Check that reporting rate is changed back to normal reporting rate		Ok
<u>Item 8:</u> Move position into TZ of region 1 to high sea	Check that channels A1 and AIS1 are used	A1 and AIS1 are used for Tx	Ok
	Check the limit of the TZ (4 nm = 7 minutes)	The border of TZ is between 9 and 9.5 min <u>Retest 03.09.04 Ba</u> Border of TZ is between 7.0 and 7.1 from border of area	Ok
	Check that reporting rate is doubled		Ok
Move position out of the TZ of region 1, into high sea	Check that channels AIS1 and AIS2 are used		Ok
	Check the limit of the TZ (5 nm = 8.8 minutes)	The border of TZ is between 4.5 and 5.5 min <u>Retest 03.09.04 Ba</u> Border of TZ is between 8.9 and 9.0 from border of area	Ok

	Check ACA and TXT output (No required)	There is an correct TXT ID 36 output and output of ACA and ACS, all fields empty. We recommend to leave the corner point lat and lon empty but to fill all other fields with the actually used (default) data like channel 2087 and 2088... Retest 19.08.04 Ba: All fields are filled except corner point and information source (ok) TZ is 4, should be 5 for default area Retest 03.09.04 Ba TZ size is 5 All values of ACS sentence are incorrect: UTC = 246060.0000 Day = 29 (test date 19.) Month = 01 (test month 08) Year = 1899 (test year 2004) Retest 03.09.04 Ba For stored areas the ACS sentence data are ok except the day. Areas started at 03.09.2004 are stored as 04.09.2004. For high see there are still the above data. I think this is not critical but I recommend to set the date fields to null (empty) fields because there is not valid date and time available. Retest 29.09.04 Ba: The date of ACS output is ok The unavailable fields of the ACS of high sea are empty now (null fields).	Ok
	ACA: check in use flags and time of in use flag	The in use flag and time of in use flag are empty, should be set to the correct values Retest 19.08.04 Ba: In use flag and time of in use flag are ok	Ok
	Check that reporting rate is changed back to normal reporting rate		Ok

08.04.04 Ba	Test details part 2 – Channel management by VDL msg 22		
Test item	Check	Remark	Result
The same area and movement is used as in test part 1.			
Item 1: In high sea area (run 2: channel A = AIS1, change channel B to A2)	Record 1 frame in run 1 and 2 frames in run 2 (1 on the old channels and 1 on the new channels)		
	Check that channels AIS1 and AIS2 are in use	Are used for Tx and Rx	Ok
Item 2: Move position into transitional area of region 2, first frame after transition	Check that EUT continues TX on AIS1 and AIS2 for 1 frame		Ok
	Check that EUT releases the slots on AIS2 by msg 1 with time-out 0 and no slot offset		Ok
	Check that channel AIS 1 and **A2** are used for **Rx**		Ok
Item 3: In outer transitional area of region 2, next frames after transition (run 1: channel A = AIS1, change channel B to A2)	Check allocation of additional slots on channel A (AIS1) using msg 3		Ok
	Check complete slot allocation on channel B (A2) using msg 3		Ok
	Check that channel AIS 1 and A2 are used for Tx	AIS 1 and A2 are used for Tx	Ok
	Check that channel AIS 1 and A2 are used for Rx		Ok
	Check that reporting rate is doubled		Ok
	Check that msg on AIS1 are output on PI (VDM/VDO) as channel A and A2 as channel B	Tx: AIS 1 is output as A, A2 is output as B in VDO Rx: The A2 channel is output as channel B and AIS1 is output as A in VDM	Ok Ok
Item 4: Move into inner transitional area of region 2, crossing the area border, (run 2: change channel A to A2 and channel B to B2)	Check that msg on AIS1 are output on PI (VDM/VDO) as channel B and A2 as channel A (channels reverted)	AIS 1 is output as A, A2 is output as B Channels are not reversed Retest 15.06.04 Ba: No change Retest 18.08.04 Ba: Channel usage is ok	Ok
Item 5: Move position into the area of region 2 (out of TZ), first frame after transition	Check that EUT continues TX on AIS1 and A2 for 1 frame		Ok
	Check that EUT releases all slots on AIS1 by msg 1 with time-out 0 and no slot offset		Ok
	Check that EUT releases every second slot on channel A2 by msg 1 with time-out 0 and no slot offset (for reverstion to normal reporting rate		Ok

	Check that channel A2 and **B2** are used for **Rx**		Ok
Item 6: Inside area of region 2, next frames after transition (run 1: change channel A to A2 and channel B to B2)	Check allocation of Slots on channel B (B2) using msg 3		Ok
	Check that channels A2 and B2 are used for Tx		Ok
	Check that channel A2 and B2 are used for Rx		Ok
	Check that reporting rate is back to normal reporting rate		Ok
	Check that msg on A2 are ouptput on PI (VDM/VDO) as channel A and B2 as channel B	A2 is output as channel B and B2 is output as channel A in VDM and VDO Retest 18.08.04 Ba: Channel usage is ok	Ok

29.09.04 Ba	Test details – Check of Tx/Rx mode		
Test item	Check	Remark	Result
Set Tx/Rx-Mode in msg 22 to 0	Check that mode is correctly stored		Ok
	Check that channel A and B are used for Tx		Ok
	Check that channel A and B are used for Rx		Ok
Set Tx/Rx- Mode in msg 22 to 1	Check that mode is correctly stored	Mode is not stored There is an VDM output of msg 22 with the correct data, but no ACA and TXT output, and the area is not stored, or in case it was already stored the mode was not changed Retest 26.10.04 Ba: Area setting is stored Tested with complete area R2 (position inside) and with a MMSI addressed msg 22	Ok
	Check that channel A only is used for Tx		Ok
	Check that channel A and B are used for Rx		Ok
	Check that the reporting rate is correct	Reporting rate = 10s	Ok
Set Tx/Rx-Mode in msg 22 to 2	Check that mode is correctly stored	Same as mode 1 Retest 26.10.04 Ba: Area setting is stored	Ok
	Check that channel B only is used for Tx		Ok
	Check that channel A and B are used for Rx		Ok

5.3 17.3 Regional area designation by serial message

(M.1371 A1/4.1.3)

Repeat test 17.2 using ACA serial message for channel assignment.

29.09.04 Ba	Test details – Channel management by ACA sentence on PI		
Test item	Check	Remark	Result
Set-up EUT in autonomous mode transmitting on channel AIS1/AIS2, send 2 ACA sentences to the PI , defining 2 adjacent areas with channels A1, B1 and A2, B2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 1nm. Set the position outside the areas. Areas are in SW quadrant. File name is AIACA_Region_17_3_SW.sst Set the positions near the limits of the transitional zones to check the dimensions			
Display of defined area	Check that the defined area is correctly stored (displayed on MKD)		Ok
	Check ACA and TXT output on PI (not required but recommended.		Ok
Item 1: In high sea area	Check that channels AIS1 and AIS2 are in use		Ok
Item 2: Move position into outer TZ of region 2	Check ACA and TXT output (No required)	No output	Ok
	Check the limit of the TZ (5 nm = 5.8 minutes)	TZ size seems to be 5 min instead of 5 Nm = 5.8 min Retest 26.10.04 Ba: TZ is entered between 5.7 and 5.9 min from area border	Ok
	Check that channel AIS 1 and A2 are used		Ok
	Check that reporting rate is doubled		Ok
Item 3: Move position into inner TZ of region 2 (crossing the area border)	Check ACA and TXT output (Required)		Ok
	Check the border of area		Ok
Item 4: Move position into region 2 (out of TZ)	Check ACA and TXT output (not required)	No ACA and TXT output	Ok
	Check the limit of the TZ (2 nm = 2.3 minutes)	TZ size seems to be 2 min instead of 2 Nm = 2,3 min Retest 26.10.04 Ba: TZ is entered between 2.4 and 2.2 min from area border	Ok
	Check that channel A2 and B2 are used		Ok
	Check that reporting rate is changed back to normal reporting rate		Ok

Item 5: Move position into TZ between region 1 and 2, inside area 2	Check that channels A2 and A1 are used		Ok
	Check that reporting rate is doubled		Ok
Item 6: Move position into area 1 (inside the TZ) (crossing the area border)	Check ACA and TXT output (Required)		Ok
	Check the border of area		Ok
Item 7: Move position into region 1 (out of TZ)	Check that channels A1 and B1 are used		Ok
	Check the limit of the TZ 1 nm = 1.15 minutes)	TZ size seems to be 1 min instead of 1 Nm = 1.16 min Retest 26.10.04 Ba: TZ is left between 1.1 and 1.2 min from area border	Ok
	Check that reporting rate is changed back to normal reporting rate		0k
Item 8: Move position into TZ of region 1 to high sea	Check that channels A1 and AIS1 are used		Ok
	Check that reporting rate is doubled		Ok
Move position out of the TZ of region 1, into high sea	Check that channels AIS1 and AIS2 are used		Ok
	Check that reporting rate is changed back to normal reporting rate		Ok

25.08.04 Ba	Test details – Check of Tx/Rx mode		
Test item	Check	Remark	Result
Set Tx/Rx-Mode to 0	Check that mode is correctly stored		Ok
	Check that channel A and B are used for Tx		Ok
	Check that channel A and B are used for Rx		Ok
Set Tx/Rx-Mode to 1	Check that mode is correctly stored		Ok
	Check that channel A only is used for Tx	Tx on A only Remark: At change from mode 0 to 1 the slots on channel B are not released. There is a rescheduling on channel A using msg 3. This is not necessary at a reporting rate of 20 s because the reporting rate on channel A is not changed	Ok acc
	Check that channel A and B are used for Rx		Ok
	Check that the reporting rate is correct	Reporting rate is 20 s We expect a reorting rate of 10 s according to the required reqorting rates depending on speed. This is not completely clear, therefore we accept also a reporting rate of 20 s Retest 29.09.04 Ba: Reporting rate has been changed from 20 s to 10 s	Ok
Set Tx/Rx-Mode to 2	Check that mode is correctly stored		Ok
	Check that channel B only is used for Tx	See mode 1	Ok
	Check that channel A and B are used for Rx		Ok
Set Tx/Rx-Mode to 3	Check that mode is correctly stored	Mode 3 is stored but not performed Retest 29.09.04 Ba: Mode 3 is implemented now	Ok

	Check that EUT is not transmitting	Mode 3 is handled like mode 0, transmission on both channels. It is not completely clear if mode 3 has to be implemented because it can not be transmitted in msg 22. We strongly recommend to implement this mode. See note) If this mode is not implemented it should not be stored and displayed as mode 3 but as mode 0 as it is performed. Otherwise it is very confusing for the operator. Retest 29.09.04 Ba: EUT stops transmission EUT does not release the slots when it stops transmission. We recommend to force the time-out to 0 and release the slots in one frame	Ok acc
	Check that channel A and B are used for Rx		Ok

Note) Using an area setting with mode 3 is in our opinion the best way to implement a silent mode for use e.g. in piracy areas.
The main advantage is that it is automatically limited to this area. As soon as the ship leaves the area the AIS unit automatically starts transmission again. It is not possible to forgot the reactivation of transmission.
In addition on this way a silent mode can be handled also be external equipment like ECDIS or radar on a defined way.

5.4 17.4 Power setting

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit channel management message (msg 22) defining output power high/low.

Repeat test using ACA and manual input.

Required result

Check that EUT sets output power as defined.

17.06.04 Ba	Test details – Power setting by msg 22		
Test item	Check	Remark	Result
The EUT has to be in an area with regional operating settings and the channels as used in the following msg 22. Transmit a msg 22 from VDL generator like the following: 22,0,2345,0,2086,1086,0,**1**,[MMSI(MSB)],[MMSI(LSB)],1,0,0,,0			
Channel switch	Check that the EUT doesn't switch channels	The power change is done with a complete rescheduling including stop of transmission for 1 frame (I think for building up a new slot table). The should not be done if only the power level has been changed. There is no reason for a rescheduling, but some disadvantages (e.g. the reporting rate requirement is not fulfilled). Retest 18.08.04 Ba: No change. Again EUT stops transmission for 1 frame and then does a rescheduling. Remark: When power is changed by ACA there is no rescheduling (ok) Retest 29.09.04 Ba: Power level is changed without rescheduling	Ok
Power low	Check that the transmitting power is changed from high to low		Ok
MKD	Check the low power settings are displayed on MKD	No MKD available Retest 18.08.04 Ba: Low power is displayed	Ok
Transmitt the same message 22, but power setting to 0 = high power			
Power high	Check that EUT reverts to high power		Ok

17.06.04 Ba	Test details – Power setting by ACA		
Test item	Check	Remark	Result
Apply the following message at PI: File name = AIACA_region_in_ch86.sst. Set power flag to 1 = low power and channels to actually used channels			
Power low	Check that the transmitting power is changed from high to low		Ok
MKD	Check the low power settings are displayed on MKD	Retest 18.08.04 Ba: Low power is displayed	Ok
Transmitt the same ACA sentence, but power setting to 0 = high power			
Power high	Check that EUT reverts to high power		Ok

25.08.04 Ba	Test details – Power setting by manual input		
Test item	Check	Remark	Result
Set the power level of the region in use to low power, Don't change the channels			
Power low	Check that the transmitting power is changed from high to low		Ok
Set power level back to high power			
Power high	Check that EUT reverts to high power		Ok

5.5 17.5 Message priority handling

(M.1371 A1/4.1.8)

Method of measurement

Set-up standard test environment and operate test equipment with 90% channel load. 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. Initiate the transmission of two 5 slot messages (msg 12 and msg 8) by the EUT. Record transmitted messages on both channels.

Required results

Check that EUT transmits the messages in correct order according to their priority (ITU-R M.1371 A/3.3.8.1 table 13).

This test is modified in that way that first a BBM sentence is sent to make the EUT busy with a transmission process. Then the 2 test sentences with msg 8 and msg 12 are applied.

Otherwise the EUT has already started the transmission process of the first msg, has allocated slots or even has already transmitted the msg before the input of the ABM sentence with the msg 12 has been completed. In this case it would not be possible to transmit the msg 12 first.

17.06.04 Ba	Test details – Message priority handling		
Test item	Check	Remark	Result
Simulate a channel load of 90% on both channels, set reporting rate to 2 s Apply an BBM sentence with msg 8 and immediately following an ABM sentences with msg 12 to the PI port. File name is AIBBM_ABM_17_5.sst Check transmissions by VDL analyser.			
Transmission order	Check that msg 12 is transmitted first because of higher priority	Under normal condition (only 1 other transponder) only the first msg 8 is transmitted. The other 2 message (8 and 12) are not transmitted (ABK with type 2) Retest 18.08.04 Ba: Msg 12 is transmitted with higher priority. Tx order was 12,8,8 or 8,12,8 in different tests	Ok

5.6 17.6 Slot reuse (link congestion)

(M.1371 A1/4.4)

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 to allocate slots for a base station. Assure that at test receiver location the signal level received from EUT exceeds the signal level received from test transmitter. Record transmitted messages and check frame structure. Set up additional test targets to simulate a VDL load of >90% until slot reuse by EUT is observed.

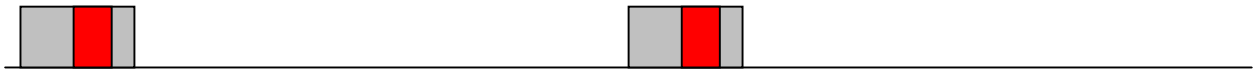
Required results

Check that the nominal reporting rate for Position Report msg 1 is achieved ±10% (allocating slots in selection interval SI) under link congestion conditions. Confirm that the slot occupied by the most distant station (within selection interval) is used by the slot reuse algorithm.

Check that a station is not subject to slot reuse more than once a frame. Check that slots allocated by a local base station are not subject to slot reuse.

Used test procedure:

In one frame 3 blocks of 60 targets in consecutive slot are transmitted. The 3 blocks start at slot 1, 751 and 1501.
The EUT is set to 2 s reporting rate to increase the probability that the the relevant selection intervals are completely covered by targets..



The gray area is covered by targets, the red area is the selection interval of 15 slots.

The targets are numbered from 1 to 60 and transmitted in the order of the IDs. They are devided into 2 groups:

- The even numbered targets have a low distance (1..2 Nm),
- the odd numbered targets have a high distance to the EUT (about 30 Nm)

This test have to be run for at minimum 30 minutes to observe a sufficient number of slot allocations (every 3-8 min). The selected slots of the selection intervals covered by targets have to be checked.

16.06.04 Ba	Test details – Slot reuse		
Test item	Check	Remark	Result
This test can be done as described before.			
Reporting rate, use of selection interval	Check that the slots are selected within the SI		Ok
Slot reuse	Check that only the slots of odd numbered targets are used		Ok
	Check that a the slot of a target is not used twice in a frame	Most of the time a target is 2 times subject of slot reuse, in 2 frames it is reuset in all 3 selection intervals Retest 18.08.04 Ba: Still reusing 2 targets in the same frame. See note 2) Retest 15.09.04 Ba: Same problem Retest 29.09.04 Ba: Targets are only reused once in a frame	Ok
Reserved Slot	Check that slots reserved by msg 20 are not used	The test of use of reserved slots is done in 16.6.5 Fixed allocated transmissions (FATDMA)	

Note) The interpretation of the requirement: “Check that a station is not subject to slot reuse more than once a frame” may not be very clear.

Our understanding is that a station is subject ot slot reuse, if a slot of this station is (re)used by the EUT.

The purpose of this requirement is that, if the transmission in one slot is jammed by slot reuse, it can be received in the other slots.

Note 2) For better understanding, could you please give us information regarding the question when a target is reused:

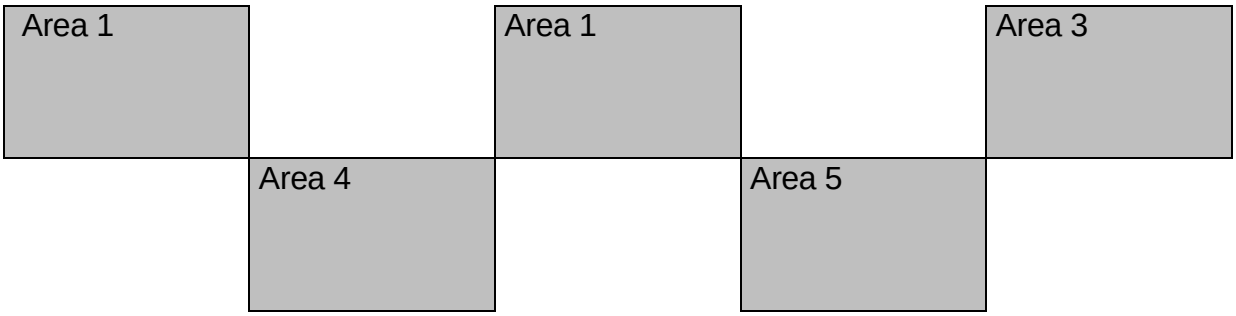
- Do you assume the own transmission slot as free? (since there is no other target received in this slot - because of own transmission)
- Do you take into account the time-out of the reused targets? That means, if the EUT reuses a target, it can not receive it in the next frames. Do you assume that this slot is free after counting down the time-out from from the time-out of the last received message of this target.

5.7 17.7 Management of received regional operating settings

(7.4.1)

General area management problems			
Date	Item	Remark	Result
25.08.04 Ba	Channel usage	With the EUT 1 there is the problem that the channel which are used are 2 channels higher as the channels in the area setting, e.g.: Setting: 2078/2080 used: 2080/2082 Setting: 2080/2082 used: 2082/2084 The EUT 2 does not show this problem. The software version is the same in both units. Retest 10.11.04 Ba: This problem has only be found on this specific unit. 3 other EUT are using the correct channels. So it seems to be a hardware problem of this unit (Synthesizer frequency offset)	acc
13.09.04	Area display on MKD	Three areas are stored, but on MKD only the High Sea area is displayed, all other places are empty. The ACA request shows the correct areas Retest 29.09.04 Ba: Areas are displayed now. The display of regional settings is not always updated correctly, mainly after deleting some areas not all information is deleted, e.g. channels or in use flag Retest 11.11.04 Ba: After deleting the areas all values are deleted or set to the default values	Ok
13.09.04	Rx problem	The EUT is not receiving on channel A, Tested on channel AIS1/AIS2 and 2084/2086 After some restarts Rx on channel A was ok Retest 29.09.04 Ba: EUT is receiving on both channels	Ok
01.10.04 Ba	Area acceptance	Areas No 4 and 5 as shown in “Note) accepted areas” are not accepted Retest 29.10.04 Ba Areas are accepted now	Ok
25.10.04 Wa	Area handling	After the message “channel managment parameter change” the msg “all transmissions enable” and “own reports disable” pop up . Why “own reports disable” Remark 29.10.04 Ba: These TXT message are output because the Tx is disabled for some time to build up a slot map on the new channels and then the Tx are enabled again	Ok

Note) accepted areas



5.7.1 17.7.1 Test for replacement or erasure of dated or remote regional operating settings

(7.4.1)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Send a valid regional operating setting to the EUT by msg 22 with the regional operating area including the own position of the EUT. Consecutively send a total of seven (7) valid regional operation settings to EUT, using both msgs 22 and DSC telecommands, with regional operating areas not overlapping to the first and to each other. Perform the following in the order shown:

a) Send a ninth msg 22 to the EUT with valid regional operating areas not overlapping with the previous eight regional operating areas.

b) Step 1: Set own position of EUT into any of the regional operating areas defined by the second to the ninth telecommands sent to the EUT previously.

Step 2: Send a tenth telecommand to the EUT, with a regional operating area which partly overlaps the regional operating area to which the EUT was set by Step 1 but which does not include the own position of the EUT.

c) Step 1: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands.

Step 2: Consecutively set own position of EUT to within all regions defined by the previous telecommands.

Required results

After the initialization, the EUT should operate according to the regional operating settings defined by the first msg 22 sent.

a) The EUT shall return to the default operating settings.

b) Step 1: Check that the EUT changes its operating settings to those of that region which includes own position of the EUT.

Step 2: Check that the EUT reverts to the default operating settings.

Note: Since the regional operating settings to which the EUT was set in Step 1 shall be erased due to Step 2, and since there is no other regional operating setting due to their non- overlapping definition, the EUT shall return to default.

c) Step 1: Check that the EUT operates with the default settings.

Step 2: Check that the EUT operates with the default settings.

17.06.04 Ba	Test details – Test of replacement or erasure of dated or remote regional operating settings		
Test item	Check	Remark	Result
The following check of area entries can be done by MKD or by request of ACA			
Send by ACA • 1 area including own position • 7 areas not overlapping, not including own position File name: AIACA_8_regions_17_7_1.sst	Check that area 1...7 are displayed on MKD	No MKD available. → The simulated MKD is completely incorrect displaying the stored areas <u>Retest 29.09.04 Ba:</u> All 8 areas are displayed correctly	Ok
	Check that all 8 areas are output on PI after request by sentence xxAIQ,ACA	(12:04)	Ok
a) Send a 9. msg 22 to the EUT	Check that the first area is deleted		Ok
	Check that the EUT returns to the default operating settings		Ok
b) step 1: Set own position to one of the 7 areas	Check that the EUT changes its operating settings according to that region		Ok
b) step 2: Send an area overlapping the area of step 1 not including own position	Check the overlapped area is deleted and replaced by the new one		Ok
	Check that the EUT reverts to the default operating settings		Ok
d) <u>Erasure by distance</u>: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands	Check that all areas are deleted		Ok
<u>Check of erasure</u>: Set own position of EUT to within all regions defined by the previous telecommands.	Check that the EUT operates with the default settings because the areas are deleted		Ok

ACA Format of high sea area	The format of the high sea area if it is not in use is incorrect.. The fields of “in use flag” and “time of in use flag” are missing. There has to be at minimum the 2 “,” as field separators. If the intention is to indicate that the high sea area is left the in use flag should be set to “0” and the “time of in use change” should get the actual time when the high sea area is left. Retest 18.08.04 Ba: Inuse flag and time of last change of inuse flag are included in the ACA with correct values The transitional zone size is output as “4”, should be “5” because the Default transitional size is 5. Retest 29.09.04 Ba: The TZ size of high sea area is displayed as 5	Ok Ok
Invalid character in ACA	(12:04:38) In an ACA output of high sea area there was an invalid character in the “Source” field. It has to be checked if this is repeated to be sure that it was not an logging error Retest 18.08.04 Ba: No invalid character found in ACA output	Ok

5.7.2 17.7.2 Test of correct input via Presentation Interface or MKD

(7.4.1)

Method of measurement

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

following tests in the following order:

a) Send msg 22 or a DSC telecommand with valid regional operating settings to the EUT with a regional operating area, which contains the current position of own station.

b) Input a different, valid regional operating setting via the MKD.

c) Send a different regional operating setting with a regional operating area which partly overlaps the regional operating area input via the MKD to the EUT via the Presentation Interface in the previous step, and which contains the present position of own station.

d) Input the default operating settings via the MKD for the regional operating area, which was received by the previous command via the Presentation Interface.

e) Send msg 22 or a DSC telecommand with a different regional operating setting to the EUT with a regional operating area, which contains current position of own station.

f) Within two hours, after e), send a different regional operating setting to the EUT via Presentation Interface with a valid regional operating area overlapping the regional operating area sent to the EUT by msg 22 or a DSC telecommand.

Required results

a) Confirm that the EUT uses the regional operating settings commanded by msg 22 or DSC telecommand.

b) Step 1: Confirm that the regional operating settings of the previous msg 22 or DSC telecommand are displayed to the user on the MKD for editing.

Step 2: Check, that the EUT allows the user to edit the displayed regional operating settings. Check, that the EUT does not accept incomplete or invalid regional operating settings. Check, that the EUT accepts a complete and valid regional operating setting.

Step 3: Check, that the EUT prompt the user to confirm the intended change of regional operating settings. Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings.

Step 4: Check, that the EUT uses the regional operating settings input via the MKD.

c) Check, that the EUT uses the regional operating settings received via the Presentation Interface.

d) Check, that the EUT accepts the default operating settings for the regional operating area received in c). Check, that the EUT uses the default operating settings.

e) Check, that the EUT uses the regional operating settings commanded to it by msg 22 or DSC telecommand.

f) Check, that the EUT does not use the regional operating setting commanded to it via the Presentation Interface.

17.06.04 Ba	Test details – Correct input via Presentation Interface or MKD		
Test item	Check	Remark	Result
Send msg 22 with same settings as in 17.2 Channel management, set position of own ship into this area			
Request of stored areas	Check that the stored areas can be requested by $AIxxQ,ACA An external equipment can not do area management without beeing able to request the actual settings.	Test 17.06.04 Ba	Ok
a) Use of settings	Confirm that the EUT uses the regional operating settings commanded by msg 22		Ok
b) MKD input Entering new area by MKD	Step 1: Confirm that the regional operating settings of the previous msg 22 is displayed to the user on the MKD for editing.		Ok
	Step 2: Check, that the EUT allows the user to edit the displayed regional operating settings.		Ok
	Check, that the EUT does not accept incomplete or invalid regional operating settings.		Ok
	Check, that the EUT accepts a complete and valid new regional operating setting.		Ok

	Step 3: Check, that the EUT prompt the user to confirm the intended change of regional operating settings		Ok
	Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings.	The user cannot return to the editing menu. The "Cancel button finishes the editing, and the changed data are deleted.	Ok
Move position inside the new area	Step 4: Check, that the EUT uses the regional operating settings input via the MKD.		Ok
c) New area by ACA Input a new area via PI (ACA sentence) overlapping area of b), position inside	Check, that the EUT uses the regional operating settings received via PI		Ok
d) Default settings via MKD Input the default operating settings via the MKD for the regional operating area of c)	Check, that the EUT accepts the default operating settings for the regional operating area		Ok
	Check, that the EUT uses the default operating settings		Ok
e) Area setting by VDL Send message 22 with a different regional operating setting to the EUT with a regional operating area, which contains current position of own station	Check, that the EUT uses the regional operating settings commanded to it by message 22		Ok
f) Priority of VDL msg Rejection of a shipborne (ACA) regional operating setting when overlapping a setting from base station not older than 2 hours (Clarifications to 1371, 2.54 paragraph 4	Check, that the EUT does not accept the regional operating setting commanded to it via the Presentation Interface.		Ok

5.7.3 17.7.3 Test of addressed telecommand

(7.4.1)

Method of measurement

Set-up a standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order:

a) Send msg 22 or a DSC telecommand with valid regional operating settings, that are different from the default operating settings, to the EUT with a regional operating area, which contains the current position of own station.

b) Send an addressed msg 22 or an addressed DSC telecommand to the EUT with different regional operating settings than the previous command.

c) Move the EUT out of the regional operating area defined by the previous addressed telecommand into an area without regional operating settings.

Required results

a) Check, that the EUT uses the regional operating settings commanded to it in a).

b) Check, that the EUT uses the regional operating settings commanded to it in b).

c) Check, that the EUT reverts to default.

17.06.04 Ba	Test details – Test of addressed telecommand		
Test item	Check	Remark	Result
a) Send msg 22 with valid regional operating settings, with a regional operating area, which contains the current position of own station.	Check, that the EUT uses the regional operating settings commanded to it		Ok
b) Send an addressed DSC msg to the EUT with different regional operating settings	Check, that the EUT uses the regional operating settings commanded to it		Ok
b) Send an addressed msg 22, addressed **as ID 2**, to the EUT with different regional operating settings	Check, that the EUT uses the regional operating settings commanded to it		Ok
c) Move the EUT out of the regional operating area defined by the previous addressed telecommand	Check, that the EUT reverts to default		Ok

5.7.4 17.7.4 Test for invalid regional operating areas (3 areas with same corner)

(7.4.1)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order after completion of all other tests related to change of regional operating settings:

a) Send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by msg 22 or DSC telecommand, Presentation Interface input and manual input via MKD. The current own position of the EUT shall be within the regional operating area of the third regional operating set ting.

b) Move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

Required test results

a) Check, that the EUT uses the operating settings that were in use prior to receiving the third regional operating setting.

b) Check, that the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

17.06.04 Ba	Test details – Test for invalid regional operating areas (three regional operating areas with same corner		
Test item	Check	Remark	Result
a) Send three different valid regional with adjacent corners by ACA, File name: AIACA_region_17_7_4.sst Position inside 3rd area.	Check, that the 3rd area is refused and settings are not used	The 3rd area is accepted but the 4th area is refused (4 areas adjacent to the same point)	acc
b) Move own position to the first 2 areas	Check, that the EUT uses the operational settings of these areas		Ok

5.7.5 17.7.5 Self-Certification of other conditions

(7.4.1)

The fulfilment of all other conditions of 7.4.1 shall be self-certified by the manufacturer.

Date	Result	Status
17.06.04 Ba	No Self-Certification required	Ok

5.8 17.8 Continuation of autonomous mode reporting rate

(M.1371- 1 A2/3.3.6, IALA Technical clarifications to recommendation ITU- R M.1371- 1)

Method of test

When in the presence of an assigned mode command and in a transition zone, check that the EUT continues to report at the autonomous mode-reporting rate.

Required result

Ensure that the autonomous reporting rate is maintained.

17.06.04 Ba	Test details – Continuation of autonomous mode reporting rate		
Test item	Check	Remark	Result
Set the EUT into a transitional zone Send assignment commands msg 16 with an higher update rate to the EUT			

Rate assignment command in a transitional zone	Check that an rate assignment command is ignored in a transitional zone	• The msg type is changed to 2, but the EUT continues at the autonomous reporting rate. • The msg 2 was not changed back to 1 (checked for 15 min). • 7 min after assigned command the PI output stopped The stopp of PI output could not be reproduced in a second test. Maybe this happend independent of the actual test. Retest 23.08.04 Ba: The command is completely ignored, there is also no VDM output. Therefore I cannot verify that the msg 16 has been received. So I can only assume that the msg has been received and that there is no VDM output because ignoring this command. I recommend to output a VDM of the received msg 16, but do no further execution of the assignment command. Retest 26.11.04 Ba: There is a VDM output, but command is not executed	Ok Ok
Slot assignment command in a transitional zone	Check that an slot assignment command is ignored in a transitional zone	• The msg type is changed to 2, but the EUT continues at the autonomous reporting rate. • The msg 2 was not changed back to 1 (checked for 15 min). Retest 23.08.04 Ba: Same as rate assignment. I recommend to output the received msg as VDM. Retest 26.11.04 Ba: There is a VDM output, but command is not executed	 Ok

6 18 Specific tests of Transport Layer

(7.5)

6.1 18.1 Addressed messages

(M.1371 A1/5.3.1)

6.1.1 18.1.1 Transmission

(M.1371 A1/5.3)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Set up a test target for scheduled transmissions on channel AIS1 only. Initiate the transmission of an addressed binary message (msg 6) by the EUT (test target as destination). Record transmitted messages on both channels.

Required results

Check that the EUT transmits msg 6 on channel AIS1. Repeat test for AIS2.

Basic test of addressed message is made in **2.1.4.1 "**14.1.4.1 Transmit an addressed message**"**

The test procedure is modified in that way that the test target is transmitting on both channels, and in case of channel = 0 it is checked that the transmission is always on that channel on that the target transponder was last received.

15.06.04 Ba	Test details - Addressed binary message 6		
Test item	Check	Remark	Result
Transmit an addressed binary message 6 by sending an ACA sentence to the PI. PI sentence: File AIABM_bin.sst: !AIABM,1,1,2,000005002,x,6,06P0test,0 Change transmission channel x according to test item Transmit some messages for each test item and check the used channel.			
Channel = 0 (autoselect)	Check tx on last received channel		Ok
Channel = 1 (A)	Check Tx on channel A		Ok
Channel = 2 (ch. B)	Check Tx on channel B		Ok
Channel = 3 (ch. A+B)	Check Tx on channel A+B		Ok

15.06.04 Ba	Test details - Addressed safety related message 12		
Test item	Check	Remark	Result
Transmit an addressed safety related message 12 by sending an ACA sentence to the PI. PI sentence: File AIABM_safety.sst: !AIABM,1,1,2,000005002,x,12,D5CD,0 (D5CD = „TEST“. Change transmission channel x according to test item Transmit some messages for each test item and check the used channel.			
Channel = 0 (autoselect)	Check tx on last received channel		Ok
Channel = 1 (ch. A)	Check Tx on channel A		Ok
Channel = 2 (ch. B)	Check Tx on channel B		Ok
Channel = 3 (ch. A+B)	Check Tx on channel A+B		Ok
Tx on 2 channels, Ackn.	Check that the repetition is stopped when an ackn is received on any of the 2 channels	If the transmission on 1 channel is acknowledged (msg) the transmission on the other channel is continued. See note) Retest 12.07.04 Ba: No change Retest 18.08.04 Ba: No change Retest 14.08.04 Ba:: The EUT does now transmit first on channel A up to 4 times (of no ackn is received) and after timeout it starts the same sequence on channel B and stops when it has got a response.	Ok

Note)
An ABM is a command to transfer the included message to the other station. As soon as this is successfully finished (msg 7 received) the command is successfully executed.

The reason for the transmission on 2 channels is to improve the receiving probability. It is not a request to get a successful transmission/ackn on both channels.

The message should be transmitted on both channels. The transmission procedure including repetitions should run in parallel or one after the other and finished as soon as the first ackn on any channel is received.

15.06.04 Ba	Test details - 4 addressed binary messages 6		
Test item	Check	Remark	Result
Transmit an set of 4 addressed binary messages 6 by sending 4 ABM sentences to the PI. Transmission channel is alternating on channel A and B as indicated int the ABM sentences. PI sentence: File AIABM_4_bin.sst: A response is automatically transmitted by the addressed transponder			

VDO output of EUT	Check that the 4 messages are transmitted directly without waiting for ackn.	(09:12:30) TX/Ackn order: A: tx 1 A: rx 1 A: tx 3 B: tx 2 A: rx 3 B: rx 2 B: tx 4 B: rx 4	Ok
Channel	Check Tx on channel A and B as indicated in the ABM sentence		Ok
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentences		Ok
RX of request	Check that message is received by addressed transponder (VDM)		Ok
Received by VDL Analyser	Check msg on VDL analyser		Ok
TX of ackn. msg 7 (VDO)	Check that ackn msg 7 is transmitted by addressed transponder (VDO)		Ok
RX of msg 7 (VDM)	Check that the ackn. msg 7 is received by EUT (VDM)		Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	There is also an ackn type 1 for each transmission See 14.1.4.1 Retest 12.07.04 Ba: There are only the correct ABK sentences of type 0 for each message command	Ok

6.1.2 18.1.2 Acknowledgement

Method of measurement

Operate standard test environment and EUT in autonomous mode. Apply up to 4 addressed binary messages (msg 6; EUT as destination) to the VDL on Channel AIS 1. Record transmitted messages on both channels. Repeat with AIS2.

Required results

Confirm that EUT transmits a binary acknowledge message (msg 7) with the appropriate sequence numbers within 4 sec on the channel where the msg 6 was received. Confirm that EUT transmit the result with an appropriate message to PI.

A basic receive test is made in 2.1.4.2 14.1.4.2 Receive addressed message.

The content fields of the transmitted acknowledgement should be checked in 4.7.2 16.7.2 Transmitted messages.

15.06.04 Ba	Test details - Acknowledgement of binary message 6		
Test item	Check	Remark	Result
Transmit 4 addressed binary message with consecutive Sequential message identifiers from other Transponder File name: AIABM_4_bin.sst			
Rx of messages (VDM)	Check that the messages are received by VDM output on PI of EUT		Ok
Transmission of acknowledgement msg 7	Check transmission of ackn. by VDO output of EUT	(09:28:20) All 4 msg are received within 1 second, Tx of ackn at 1, 2,5,5 s after rx of msg 6. The last 2 ackn (5 s after Rx) are too late, therefore the other transponder repeated the msg 6 before it could receive the ackn. A ackn should be transmitted within 4 s after Rx of msg 6 <u>Retest 13.07.04 Ba:</u> No change, The last two msg 6 were not acknowledged within 5 s (test 1) and 6 s (test 2) So the message was repeated by the transmitting station. Sorry that in my comment above there was a typing error. An addressed message has to be acknowleged within 4 s because the repetition shall be transmitted in a range of 4...8 s. <u>Retest 15.09.04 Ba:</u> All 4 msg 6 are acknowledged within 4 s	Ok
Sequence numbers	Check that sequence number in ackn = sequence number of Rx message		Ok
Ackn. channel	Check that ackn Tx channel = Rx channel		Ok
RX of ackn. msg 7	Check that the ackn. msg are received by Transmitter (VDM/ABK)		Ok

6.1.3 18.1.3 Transmission Retry

(M.1371 A1/5.3.1)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of up to 4 addressed binary messages by the EUT which will not be acknowledged (i.e. destination not available). Record transmitted messages.

Required results

Confirm that EUT retries the transmission up to 3 times (configurable) for each addressed binary message. Confirm that the time between transmissions is 4 to 8 sec. Confirm that EUT transmit the overall result with an appropriate message to PI.

Basic test of addressed message is made in **2.1.4.1** **"**14.1.4.1 Transmit an addressed message**"**

15.06.04 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. PI sentence: File AIABM_bin.sst: The message is addressed to a not available transponder. So no acknowledgement is received. Record the VDO output of VDE with time stamp.			
VDO output of EUT	Check the transmission by VDO		Ok
Number of repetitions	Note and check the number or repetitions	4 transmissions	Ok
Repetition timing	Record the repetition timing. Note the time between repetitions and check that it is 4...8 s	Command at 47s, Tx at 50, 56, 00, 03 The time between the last to repetitions is too short. Evaluating the slot numbers the time is 108 slots)=2.88 s. Repetition: Tx at 5,12,14,19. The time between Tx 2 and 3 is 88 slot = 2.35 s Retest 13.07.04 Ba: The timing is ok now, see table below	Ok
ABK sentence	Note and check the ABK sentence Confirm the type = 1 (broadcast but no acknowledgement)	There is only an ABK at each transmission (should not be), but no ABK at time-out of the last transmission. See 14.1.4.1 Retest 13.07.04 Ba: There is only 1 ABK at the end after timeout, type = 1	Ok

Message sequence numbers	Check message sequence numbers of transmissions and ABK	The sequence number in the msg 6 is ok Only the first ABK includes a (correct) sequence number, The field of the other ABK is empty Retest 13.07.04 Ba: - The sequence number in the ABK is ok now, - The sequence number in msg 6 is always 0 Retest 14.09.04 Ba: The sequence number in the msg 6 is ok now	Ok Ok

Retest 13.07.04 Ba

Time distances (s)	Required	Test 1	Test 2	Test 3	Test 4
1. msg 6 to ABM	< 4s	2	3	1	1
2. msg 6	4...8 s	4	6	8	5
3. msg 6	4...8 s	7	7	6	5
4. msg 6	4...8 s	5	8	5	7
ABK	4...8 s	4	4	5	4

15.06.04 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. PI sentence: File AIABM_safety.sst: The message is addressed to a not available transponder. So no acknowledgement is received. Record the VDO output of VDE with time stamp.			
VDO output of EUT	Check the transmission by VDO	(10:41:00)	Ok
Number of repetitions	Note the number or repetitions	4 transmissions	Ok
Repetition timing	Record the repetition timing. Note the time between repetitions and check that it is 4...8 s	Tx command: 38s Tx at 42,46,50,57 Retest 13.07.04 Ba: The timing is ok.	Ok
ABK sentence	Note and check the ABK sentence Confirm the type = 1 (broadcast but no acknowledgement)	Same as msg 6 Retest 13.07.04 Ba: There is only 1 ABK at the end after timeout, type = 1	Ok
Message sequence numbers	Check message sequence numbers of transmissions and ABK	Same as msg 6 Retest 13.07.04 Ba: - The sequence number in the ABK is ok now, - The sequence number in msg 6 is always 0 Retest 14.09.04 Ba: The sequence number in the msg 6 is ok now	Ok Ok

6.2 18.1.4 Acknowledgement of Addressed safety related messages

Repeat test under 18.1.2 with addressed safety related message.

The contents of the acknowledgement should be entered in test 4.7.2 16.7.2 Transmitted messages

15.06.04 Ba	Test details - Acknowledgement of safety related text message 12		
Test item	Check	Remark	Result
Transmit 4 safety related text messages 12 with consecutive sequential message identifiers from other Transponder			
Rx of messages (VDM)	Check that the messages are received by VDM output on PI of EUT	(10:47:20)	Ok
Transmission of acknowledgement msg 13	Check transmission of ackn. by VDO output of EUT	Some ackn are transmitted to late (> 4 s after Rx) so that the msg is repeated by the other transponder Retest 13.07.04 Ba: 2 Tests: The ackn of the 2nd msg 12 is transmitted 6 s after Rx of msg 12 Retest 15.09.04 Ba: All msg 12 are acknowledged within 2 s, the 2 msg on each channel in one msg 13	Ok
Sequence numbers	Check that sequence number in ackn = sequence number of Rx message		Ok
Ackn. channel	Check that ackn Tx channel = Rx channel		Ok
RX of ackn. msg 13	Check that the ackn. msg are received by Transmitter (VDM/ABK)		Ok

6.3 18.2 (M.1371 A1/5.3) Interrogation responses

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 7 for responses with msg 5 and slot offset set to defined value on channel AIS 1. Record transmitted messages on both channels.

Required results

Check that EUT transmits the appropriate interrogation response message as requested on channel AIS1. Repeat test for AIS2.

A simple operational test is made in 2.1.3.2 14.1.3.2 Interrogation response

The check of the contents of the transmitted message should be entered in 4.7.2 16.7.2 Transmitted messages

The test cases “case 1” to “case 4” are the four cases as defined in ITU-R M1371, “3.3.8.2.11 Message 15 Interrogation”

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

15.06.04 Ba	Test details - case 1- Interrogation of msg 5, Ch 1		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 5 with given slot offset A response shall automatically be transmitted by the EUT Request is transmitted on channel 1			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Ok
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Ok
Response on VDL	Check the response on VDL with the VDL analyser, note slot offset	Slot offset = 100 and 20 as required	Ok
Response channel	Check that the response is transmitted on the request channel		Ok

15.06.04 Ba	Test details - case 1 - Interrogation of msg 5, Ch 2		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 5 with given slot offset A response shall automatically be transmitted by the EUT Request is transmitted on channel 2			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Ok
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Ok
Response on VDL	Check the response on VDL with the VDL analyser, note slot offset	Slot offset = 10	Ok
Response channel	Check that the response is transmitted on the request channel		Ok

15.06.04 Ba	Test details - case 2 - Interrogation of msg 3 and 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3 and 5 from EUT with given slot offsets A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Ok
TX of response 1 (VDO)	Check that response is transmitted by EUT (VDO)		Ok
Response 1 on VDL	Check the response on VDL with the VDL analyser		Ok
Slot selection	Check that the slot offset 1 defined in the request is used		Ok
TX of response 2 (VDO)	Check that response is transmitted by EUT (VDO)	No response Retest 13.07.04 Ba: Response (msg 5) is transmitted	Ok
Response 2 on VDL	Check the response on VDL with the VDL analyser		Ok
Slot selection	Check that the slot offset 2 defined in the request is used		Ok

15.06.04 Ba	Test details - case 3 Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3 from other AIS and msg 5 from EUT with given slot offsets 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)	(11:40-43)	Ok
TX of response (VDO)	Check that response msg 5 is transmitted by EUT (VDO)	Sometimes there is a response, sometimes there is no response (but request was received) Retest 13.07.04 Ba: Response is transmitted correctly	Ok
Response on VDL	Check the response on VDL with the VDL analyser		Ok
Slot selection	Check that the slot offset defined in the request 2.1 is used	The slot offset is 201 instead of 200 Retest 13.07.04 Ba: Slot offset is ok	Ok

15.06.04 Ba	Test details - case 4 - Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3,5 from other AIS and msg 5 from EUT with given slot offsets A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Ok
TX of response (VDO)	Check that response msg 5 is transmitted by EUT (VDO)	Sometimes there is a response, sometimes there is no response (but request was received). If there is a response, there is also a response to request msg 1.2 (second msg requested from other station) Retest 13.07.04 Ba: Response is transmitted correctly	Ok
Response on VDL	Check the response on VDL with the VDL analyser		Ok
Slot selection	Check that the slot offset defined in the request 2.1 is used	There is a response at 201 slots (request:200 from other AIS) and at 301 (request: 300) Retest 13.07.04 Ba: Slot offset is ok	Ok

6.4 18.3 Broadcast messages

(M.1371 A1/5.3)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of 5 binary broadcast messages (msg 8) by the EUT. Record transmitted messages on both channels.

Required results

Check that EUT transmits the msg 8 messages on channels A and B alternating.

Test of multislot broadcast messages is done in 2.2 14.2 Multiple slot messages

The check of message contents should be entered in 4.7.2 16.7.2 Transmitted messages

15.06.04 Ba	Test details - Binary broadcast message 8		
Test item	Check	Remark	Result
Transmit 5 binary broadcast messages 8 by sending 5 BBM sentences to the PI. PI sentence: File AIBBM_5_bin.sst: !AIBBM,1,1,[7;8;9;0;1],0,8,06P0test1,0 AIS channel for broadcast is 0: autoselect The file contains 5 BBM sentences with consecutive sequential message identifiers.			
VDO output of EUT	Check the VDO output on PI	(11:52:30), VDO in the order: Msg 4,2,5,1,3	Ok
Channel	Check Tx alternating channels A and B	According to the command order the channel usage is A,B,A,B,A, According to the Tx order it is B, B, A, A, A <u>Retest 13.07.04 Ba:</u> According to a description from SRT the msg are commanded for transmission on alternating channels. Because of the selection of the slot within the RATMA selection intervall the real transmission order may differ from the command order	Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,603988992,B,008,0,3 $AIABK, ,B,008,8,3 $AIABK, ,A,008,1,3 $AIABK, 000933890,B,008,8,3 The ABK of a broadcast message should not contain an destination MMSI because there is no destination ID <u>Retest 13.07.04 Ba:</u> The invalid MMSI is removed from ABK	Ok
Message sequence number	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
MMSI	Check Transmitter MMSI		Ok

15.06.04 Ba	Test details - Safety related broadcast message 14		
Test item	Check	Remark	Result
Transmit 5 safety related broadcast messages 14 by sending 5 BBM sentences to the PI. PI sentence: File AIBBM_5_safety.sst: !AIBBM,1,1,[6;7;8;9;0],0,8,D5CDi,0 AIS channel for broadcast is 0: autoselect The file contains 5 BBM sentences with consecutive sequential message identifiers.			
VDO output of EUT	Check the VDO output on PI	(11:09:10) Tx in the order (related to command) 4,5,2,1,3	Ok
Channel	Check Tx alternating channels A and B	According to the command order the channel usage is B,A,B,A,B According to the Tx order it is A,B,A,B,B Retest 13.07.04 Ba: See binary broadcast msg	Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,000000000,A,014,9,3 $AIABK,,B,014,0,3 $AIABK,001768128,A,014,7,3 $AIABK,000000000,B,014,6,3 $AIABK,,B,014,8,3 The ABK of a broadcast message should not contain an destination MMSI because there is no destination ID Retest 13.07.04 Ba: The invalid MMSI is removed from ABK	Ok
Message sequence number	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
MMSI	Check Transmitter MMSI		Ok

7 19 Specific Presentation Interface Tests

(7.6)

7.1 19.1 General

The EUT (Equipment Under Test) including all necessary test equipment shall be set-up and checked that it is operational before testing commences.

The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular.

The following tests shall be carried out under "Normal" environmental conditions as defined in IEC 60945.

Where appropriate, tests against different clauses of this and other chapters may be carried out simultaneously.

15.06.04 Ba	Test details - General interface tests		
Test item	Check	Remark	Result
Checksum	Check that the output sentences include a checksum		Ok
	Check that the checksum is correct		Ok

7.2 19.2 Check of the manufacturer's documentation

(7.6.1)

The following checks for formal consistency and compliance shall be made for all ports

- *approved sentences against IEC 61162*
- *proprietary sentences against IEC 61162*
- *usage of fields as required for different functions including provided default values or settings*
- *transmission intervals against IEC 61162*
- *configuration of hardware and software if this is relevant to the interface performance and port selection*

The following checks for compliance with IEC 61162

- *output drive capability*
- *load on the line of inputs*
- *electrical isolation of input circuits*

This Test does not check the documentation, this is done in 1.6 4.3 Manuals. Here the function of the EUT is checked using the documentation information, the content of the documentation is checked if the EUT complies with the requirements.

29.10.04 Ba	Test details - Check of manufacturers documentation		
Test item	Check	Remark	Result
Approved sentences	Check approved sentences against IEC 61162		Ok
Proprietary sentences	Check proprietary sentences against IEC 61162	No proprietary sentences used	Ok
Usage of Fields	Check usage of fields	There are 2 tables with a description of ROT sentence. The first table is not understandable, the second is ok The usage of the other sentences is ok <u>Retest 10.11.04 Ba:</u> There is only one sentence now in the same style for the other sentences We recommend to replace the “T” at the end of ROT by “A”, because “T” is not a possible value of this status field. <u>Retest 26.11.04 Ba</u>: The “T” has been replaced by “A”	Ok Ok
Transmission intervals	Check transmission intervals		Ok
Hardware configuration	Check hardware configuration		Ok
Output drive capability	Check output drive capability		Ok
Input load	Check input load		Ok
Electrical Isolation	Check electrical isolation		Ok

7.3 19.3 Electrical test

(7.6.1)

Method of test

Input / Output Ports configured as IEC 61162-1 or IEC 61162-2 shall be tested according to the relevant standard with regard to minimum and maximum voltage and current at the input terminals.

Required results

The interfaces shall fulfil the requirements of the relevant standards.

18.06.04 Ba	Test details - Electrical test of inputs		
Test item	Check	Remark	Result
Minimum voltage	Check that input works with minimum input voltage	LR input could not be tested, because there was no response also with high input voltage	Ok
Maximum voltage	Check that input is not damaged by maximum input voltage		Ok
Input current	Check the input current against the IEC 61162-1 or IEC 61162-2	Input current: (+ / - mA) 5V: 0.24/ -0.01 mA 10V: 0.37 / - 0.14 mA 15 V: 0.5 / -0.27 mA	Ok
Electrical Isolation	Check that sensor inputs are electrically isolated		Ok
	Check that high speed inputs are electrically isolated		Ok
	Check that power supply input is electrically isolated		Ok

7.4 19.4 Test of input sensor interface performance

EUT is not able to handle 3 ports in parallel. If sensor data for all 3 ports are provided the data on port three are ignored by the system :

Retest 22.10.04 Wa: ok

(7.6.2)

Method of measurement

Connect all inputs and outputs of the EUT as specified by the manufacturer and simulate VDL-messages using test system. Operate inputs with simulated sensor data that are both the relevant data and additional data with formatters not provided for the relevant input. Each sensor input shall be loaded with 70 to 80 percent of the interface's capacity. Record the VDL and output from the EUT's high speed port.

Required results

Verify that the output on the VDL and the presentation interface agree with simulated input and all output data is transmitted without loss or additional delay

22.06.04	Test details - Test of input sensor interface performance		
Test item	Check	Remark	Result
Load all 3 sensor inputs with 70-80 % of the interface's capacity 1 Sensor input at 4800 with position data 1 Sensor input at 4800 with log data 1 Sensor input at 38400 with heading and ROT data			
VDL contents	Check that the VDL contents agree with in input data		Ok
VDO output	Check that VDO outputs on both high speed ports agree with the sensor input data		Ok
Loss of data	Check that VDL messages are transmitted without loss of sensor data		Ok
	Check that output data at VDO output are sent without loss of sensor data		Ok
Delay of data	Check that there is no delay from sensor input change to VDL messages		Ok
	Check that there is no delay from sensor input change to VDO output		Ok

7.5 19.5 Test of sensor input

(7.6.2)

Method of measurement

Set-up standard test environment and operate inputs with simulated sensor data. Record VDL output.

a) simulate sensor information for position, speed, heading, ROT

b) simulate invalid and unavailable data

Required results

a) Verify that the recorded VDL message contents agree with the simulated sensor information.

b) Verify that affected data is set to default values.

Switch off internal GPS to get default values in case of invalid sensor data. The intention of this test is to check the conversion of sensor input data to the VDL messages, VDO output and MKD display including the test, if invalid and unavailable data are recognised.

Fall back behaviour at sensor fail is checked in another test (see 2.9.3 - 14.9.3 Monitoring of sensor data).

For message content of VDL messages 1, 2, 3 (position reports) no special test is required. Please enter the results of this test in that test table (go to 2.3.1 "Information content of msg 1" at the end of this test

General problems of sensor inputs			
Date	Item	Remark	Result
10.05.04 Ba	External Position	It seems that the EUT does not accept external position when the internal GPS does not give a position. Serial interface is ok because heading and ROT are accepted <u>Retest 03.06.04 Ba:</u> The external position is accepted when the internal GPS does not give a position (antenna disconnected). The above problem seems to be a stability problem. This has to be observed during the future test phases. <u>Retest 26.08.04 Ba:</u> In the actual test phase this problem was not found	Ok
12.07.04 Ba 17.08.04 Ba	Position sensor sentences	The position and SOG/COG from all sentences except RMC are not accepted I tried: - all 3 sensor inputs - with and without internal GPS - GLL, GNS, GGA sentence - with and without GBS sentence (RAIM) - Normal mode and differential mode. - 4800 and 38400 Bd In all cases the heading and ROT were taken from the external source with the correct values. This indicates that the physical interface and baudrate were correct. <u>Retest 17.08.04 Ba:</u> Reason for the problem is that these position sentences are accepted only if a DTM sentence with W84 is received. When DTM sentence is added positions are accepted	Ok
22.10.04 Wa	Interface Config	The config screen shows for the port speed sometimes not the actual speed e.g. 4800 instead of 38000 <u>Retest 29.10.04 Ba</u>: Baudrate is now shown correctly initially	Ok

7.5.1 GLL sentence

By changing the status/mode flag to A,A EUT indicate EPFS not available for some seconds :
Retest 03.09.04 Wa Ok

NEW : Retest 03.09.04 Wa By changing the status/mode flag to A,D EUT indicate EPFS not available for some seconds :
Retest 16.09.04 Wa Ok

21.06.04 Wa	Test details – GLL position input		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
Set status/mode to **A,A** Check on VDL	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok
Check VDO output on PI	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok
Check Display on MKD	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok
Set status/mode to **A,D** (differential mode)	Check PA-Flag = 1 on VDL		Ok
	Check PA-Flag = 1 in VDO		Ok
	Check display of differential mode on MKD		Ok
Set status/mode to **V,N** (invalid data) Check on VDL	Check latitude = 91º		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok
Check on VDO output of PI	Check latitude = 91º		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok
Check display on MKD	Check latitude = "-----"		Ok
	Check longitude = "-----"		Ok
	Check PA-Flag = 0		Ok
Set status/mode to A,A Change for latitude the number of digits after decimal point from 2 to 6	Check that latitude on VDL is correct for all numbers		Ok
Change the latitude to only degrees and minutes, without decimal point	Chack that the latitudo on VDL is correct		Ok
No GBS sentence applied	Check that RAIM-Flag = 0		Ok

7.5.2 GGA sentence

Retest 03.09.04 Wa by changing to differential mode EUT indicate EPFS not available for some seconds :
Retest 16.09.04 Wa Ok

21.06.04 Wa	Test details - GGA GPS position input		
Test item	Check	Remark	Result
Apply simulated GGA sentence to the sensor input File name is ais02_gga_vtg_hdt_rot.sst			
Set Mode = 1 (**autonomous**) Check on VDL	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok
Set mode = 2 (**differential**) Check on VDL	Short check data ok		Ok
	Check PA-Flag = 1 on VDL		Ok
Set mode = 3 (GPS-PPS) Check on VDL	Short check data ok		Ok
	Check PA-Flag = 0 on VDL		Ok
Set mode =4 (RTK fixed) Check on VDL	Short check data ok	Default data Retest 03.09.04 wa	Ok
	Check PA-Flag = 1 on VDL		Ok
Set mode =5 (RTK float Check on VDL	Short check data ok	Default data Retest 03.09.04 Wa Same prob. Retest 16.09.04 Wa	Ok
	Check PA-Flag = 1 on VDL		Ok
Set mode = 6 (dead reck.) Check on VDL	Short check default data	Valid with TS 62	Ok
Set mode = 7 (manual) Check on VDL	Short check default data	Valid with TS 61	Ok
Set mode = 8 (simulated) Check on VDL	Short check default data		Ok
Set mode = 0 (**no fix**) Check on VDL	Check latitude = 91º		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok

7.5.3 GNS sentence

21.06.04 Wa	Test details – GNS satellite position input		
Test item	Check	Remark	Result
Apply simulated GNS sentence to the sensor input, check on VDL File name is ais03_gns_vtg_hdt_rot.sst			
Set Mode = **AA** (autonomous GPS/GLONASS) Check on VDL	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok
	Check RAIM-Flag = 0		Ok
Set Mode = AN (autonomous GPS/no GLONASS)	Short check data ok		Ok
	Check PA-Flag = 0 on VDL		Ok
Set Mode = NA (no GPS/ autonomous GLONASS)	Short check data ok		Ok
	Check PA-Flag = 0 on VDL		Ok
Set Mode = **DA** (differential GPS/ autonomous GLONASS)	Short check data ok		Ok
	Check **PA-Flag = 1** on VDL		Ok
Set Mode = DD (differential GPS/ differential GLONASS)	Short check data ok		Ok
	Check PA-Flag = 1 on VDL		Ok
Set Mode = DN (differential GPS/ no GLONASS)	Short check data ok		Ok
	Check PA-Flag = 1 on VDL		Ok
Set Mode = AD (autonomous GPS/ differential GLONASS)	Short check data ok		Ok
	Check PA-Flag = 1 on VDL		Ok
Set Mode = ND (no GPS/ differential GLONASS)	Short check data ok		Ok
	Check PA-Flag = 1 on VDL		Ok
Set Mode = **NN** (no GPS/ no GLONASS)	Check latitude = 91°		Ok
	Check longitude = 181°		Ok
	Check PA-Flag = 0		Ok

7.5.4 RMC sentence

21.06.04 Wa	Test details – RMC position input		
Test item	Check	Remark	Result
Apply simulated RMC sentence to the sensor input File name is ais04_rmc_hdt_rot.sst			
Set status/mode to **A,A** Check on VDL	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok
Set status/mode to **A,D** (differential mode)	Short check of valid data		Ok
	Check PA-Flag = 1 in VDO		Ok
Set status/mode to **V,N** (invalid data) Check on VDL	Check latitude = 91º		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok
Set status/mode to **V,A** (invalid data) Check on VDL (Test if also status is evaluated)	Check latitude = 91º	Valid data Retest 03.09.04 Wa	Ok
	Check longitude = 181º	Valid data Retest 03.09.04 Wa	Ok
	Check PA-Flag = 0		Ok
	Check SOG = 102.3		Ok
	Check COG = 360°		Ok

7.5.5 DTM sentence

03.09.04 WA	Test details – DTM reference datum		
Test item	Check	Remark	Result
Apply simulated position sentences with DTM. Start with datum not WGS 84, change to WGS 84 and back to not WGS 84			
Apply **GLL** sentence with DTM File name: ais1d_gll_dtm_vtg_hdt_rot.sst Datum = not WGS 84	Check on VDL that data are default data		Ok
Set Datum = WGS 84	Check that data are valid		Ok
Set Datum = not WGS 84	Check that data are changed to default		Ok
Apply **GGA** sentence with DTM File name: ais2d_gga_dtm_vtg_hdt_rot.sst Datum = not WGS 84	Check on VDL that data are default data		Ok
Set Datum = WGS 84	Check that data are valid		Ok
Set Datum = not WGS 84	Check that data are changed to default		Ok
Apply **GNS** sentence with DTM File name: ais3d_dtm_gns_vtg_hdt_rot.sst Datum = not WGS 84	Check on VDL that data are default data	Test 16.11.04 Ba: Data are used Retest 22.11.04 Ba: Data are not used	Ok
Set Datum = WGS 84	Check that data are valid	Test 22.11.04 Ba:	Ok
Set Datum = not WGS 84	Check that data are changed to default	Test 22.11.04 Ba:	Ok
Apply **RMC** sentence with DTM File name: ais4d_dtm_rmc_hdt_rot.sst Datum = not WGS 84	Check on VDL that data are default data	Test 16.11.04 Ba: Data are used Retest 22.11.04 Ba: Data are not used	Ok
Set Datum = WGS 84	Check that data are valid	Test 22.11.04 Ba:	Ok
Set Datum = not WGS 84	Check that data are changed to default	Test 22.11.04 Ba:	Ok
Set Datum = WGS 84	To get valid data for further tests		Ok

7.5.6 GBS sentence

21.06.04 Wa	Test details – GBS input		
Test item	Check	Remark	Result
Apply simulated gll sentence with GBS sentence to the sensor input File name is ais01g_gll_vtg_gbs_hdt_rot.sst			
Fields with expected error of Lat and Lon contain values	Check that RAIM-Flag = 1		Ok
Fields with expected error of Lat and Lon are empty (NULL fields)	Check that RAIM-Flag = 0		Ok

7.5.7 VTG sentence

21.06.04 Wa	Test details – VTG speed input		
Test item	Check	Remark	Result
Apply simulated VTG sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
Set mode to **A** (autonomous)	Check SOG		Ok
Check on VDL	Check COG		Ok
Check VDO output on PI	Check SOG		Ok
	Check COG		Ok
Check Display on MKD	Check SOG		Ok
	Check COG		Ok
Set mode to **D** (differential)	Short check SOG/COG ok		Ok
Set mode to **N (**invalid)	Check SOG = 102.3 (default)		Ok
Check on VDL	Check COG = 360 (default)		Ok
Check VDO output on PI	Check SOG = 102.3 (default)		Ok
	Check COG = 360 (default)		Ok
Check Display on MKD	Check SOG = "-----"		Ok
	Check COG = "-----"		Ok
Set mode to E (estimated)	Short check SOG/COG default		Ok
Set mode to M (manual)	Short check SOG/COG default		Ok
Set mode to S (simulated)	Short check SOG/COG default		Ok
Delete SOG-N field and add SOG K-Field (speed in km/h)	Check SOG value in VDL It has to be converted into knots or set to default	Shown as 0 kn Retest 03.09.04 Wa	Ok

7.5.8 VBW sentence

21.06.04 Wa	Test details – VBW log input with VTG sentence valid		
Test item	Check	Remark	Result
Apply simulated VBW sentence to the sensor input File name is ais06_gll_vtg_vbw_hdt_rot.sst			
Status of bottom track: **A** (valid) Ahead and across speed available. Check on VDL	Check that SOG = resultant of ahead and across speed	VTG speed and COG in use	Acc.
	COG = calculated from SOG vector and heading	Not applicable	
Check on VDO output of PI	Check SOG = VDL SOG value		
	Check COG = VDL COG value		
Check on MKD	Check SOG = VDL SOG value		
	Check COG = VDL COG value		
Status of bottom track: **V** (invalid) Ahead and across speed not empty. Water speed valid ! Check on VDL	SOG from VTG		
	COG from VTG		
Check on VDO output of PI	SOG from VTG		
	COG from VTG		
Check on MKD	SOG from VTG		
	COG from VTG		
Status of bottom track: A (valid) Ahead available, **across speed empty (**e.g. single axis log)	SOG from VTG		
	COG from VTG		
Status of bottom track: A (valid) Ahead and across speed available, **Heading invalid**	SOG from VTG		
	COG from VTG		

21.06.04 Wa	Test details – VBW log input, no VTG		
Test item	Check	Remark	Result
Apply simulated VBW sentence to the sensor input, GPS disconnected, No VTG speed available File name is ais08_gll_vbw_hdt_rot.sst			
Status of bottom track: **A** (valid) Ahead and across speed available. Check on VDL	Check that SOG = resultant of ahead and across speed		Ok
	COG = calculated from SOG vector and heading	Only default value Retest 03.09.04 Wa	Ok
Check on VDO output of PI	Check SOG = VDL SOG value		Ok
	Check COG = calculated from SOG vector and heading	Only default value Retest 03.09.04 Wa	Ok
Check on MKD	Check SOG = VDL SOG value		Ok
	Check COG = calculated from SOG vector and heading		Ok
Status of bottom track: **V** (invalid) Ahead and across speed not empty. Water speed valid ! Check on VDL	SOG = default		Ok
	COG = default		Ok
Check on VDO output of PI	SOG = default		Ok
	COG = default		Ok
Check on MKD	SOG = default		Ok
	COG = default		Ok
Status of bottom track: A (valid) Ahead available, **across speed empty (**e.g. single axis log)	SOG = default		Ok
	COG = default		Ok
Status of bottom track: A (valid) Ahead and across speed available, **Heading invalid**	SOG from VBW or default	From VBW	Ok
	COG = default		Ok

7.5.9 OSD sentence

Date	Result	Status
09.11.04 Ba	(See my mail dated 10.10.04) There is a configuration parameter “Use OSD sentence”. If this parameter is set to “On” the OSD sentence is used as described in the test sequence below. After restart the parameter is automatically reset to “Off”. This is not acceptable because of the following situation: The unit has been installed on board, connected to a a sensor system applying OSD, OSD is activated by the configuration setting, everything works fine, and the installer leaves the ship. Some days later the unit is restarted, maybe by short break of power supply. Now there is no SOG/COG and heading available because OSD is inactivated. Nobody knows why, and in worst case it is even not detected that SOG/COG and heading is missing in the VDL transmissions Retest 22.11.04 Ba: no change Retest 24.11.04 Ba: The activation of the OSD sentence has been removed from the setting menu and therefore the OSD cannot be activated and used. The error descriptions at the test items are therefore not relevant, but can be used for future implementation of the OSD sentence.	Ok

22.06.04 Wa	Test details – OSD own ship data input		
Test item	Check	Remark	Result
Apply simulated GLL and OSD sentence to the sensor input. External GLL is required for the test because with internal position the speed is taken from the internal source too. File name is ais09d_dtm_gll_osd.sst			
Heading status = A (valid) Speed reference = B (bottom) Check on VDL	Check SOG from OSD	Not used We recommend to used the SOG with speed reference B Retest 22.11.04 Ba EUT is switching between default and SOG/COG from OSD 24.11.04 Ba: Evaluation of OSD sentence has been removed	acc
	Check COG from OSD	Not used We recommend to used the SOG with speed reference B	N/A
	Check heading from OSD		N/A
Check VDO output on PI	Check SOG from OSD	Not used	N/A
	Check COG from OSD	Not used	N/A
	Check heading from OSD		N/A
Check Display on MKD	Check SOG from OSD	Not used	N/A
	Check COG from OSD	Not used	N/A
	Check heading from OSD		N/A
Set speed reference to P (Positioning system)	Check SOG and COG from OSD	EUT is using the data for about 5 s and then for about 1 s it generates an alarm ID 29/30 and outputs default SOG/COG Retest 22.11.04 Ba: No change	N/A
Set speed reference to R Radar tracking	Check SOG and COG from OSD	Same as P Retest 22.11.04 Ba: No change	N/A
Set speed reference to W (Water speed)	Check SOG = default		N/A
	Check COG = default		N/A
	Check heading from OSD		N/A
Set speed reference to M (Manual)	Check SOG = default		N/A
	Check COG = default		N/A
	Check heading from OSD		N/A

Set speed reference to P (Positioning system) Set **heading status = V** (invalid)	Check SOG from OSD	SOG is set to default. SOG/COG do not depend on the heading, therefore there is no reason to use SOG/COG default values if heading becomes invalid After setting heading back to valid the EUT uses SOG/COG again after 3 minutes Retest 22.11.04 Ba: No change	N/A
	Check COG from OSD	Same as SOG	N/A
	Check heading = default		N/A
Change speed reference from N (kn) to K (km/h)	Check SOG value in VDL It has to be converted into knots		N/A

7.5.10 HDT sentence

22.06.04 Wa	Test details – HDT heading input		
Test item	Check	Remark	Result
Apply simulated HDT sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
Heading value = 359.0	Check heading on VDL		Ok
	Check heading on VDO		Ok
	Check heading in MKD		Ok
Change value to 359.9	Check that heading on VDL = 359 or 0, **not 360**		Ok
Delete heading value (empty field)	Check that heading = default on VDL	Displayed as 0.0 Retest 03.09.04 Wa	Ok
	Check that heading = default on VDO		Ok
	Check that heading = default on MKD		Ok
Change talker to “HC” (Magnetic compass)	Check that heading is not used	Is used	Acc.
If HC talker data are used: Apply • A HE talker with valid data • A HC talker with valid data	Check that only HE data are used and not changed sometime to HC data	Switch between HE and HC value Retest 03.09.04 Wa	Ok
Apply • A HE talker with valid data • A HC talker without data	Check that only HE data are used and not changed sometime to invalid	Switch between HE and HC value Retest 03.09.04 Wa	Ok

7.5.11 ROT sentence

22.06.04 Wa	Test details – ROT Rate of Turn input		
Test item	Check	Remark	Result
Apply simulated ROT sentence to the sensor input, Talker = TI File name is ais01_gll_vtg_hdt_rot.sst			
ROT status = **A** (valid) ROT value = 0.0 degr./min	Check ROT on VDL		Ok
	Check ROT on VDO		Ok
	Check ROT on MKD		Ok
Change rate of turn to different values according to the check column and check the VDL value. The VDL value has to be the nearest value according the conversion formula (see conversion table)	10 converted to 10.0 (15)	8.7 Retest 03.09.04 Wa	Ok
	20 converted to 19.7 (21)	19.7 on MKD as 19.6 19.8 Retest 03.09.04 Wa	Ok
	60 converted to 61.1 (37)	57.9 Retest 03.09.04 Wa	Ok
	180 converted to 177.2 or 182.8 (63/64)	177.2 on MKD as 177.2 Retest 03.09.04 Wa	Ok
	360 converted to 361.6 (90)	353.6 Retest 03.09.04 Wa	Ok
	720 converted to 708.7 (126)	697.5 Retest 03.09.04 Wa	Ok
	-20 converted to 19.7 (-21)	-19.7 on MKD as -19.6 Retest 03.09.04 Wa	Ok
	-720 converted to –708.7 (-126)	-697.5 Retest 03.09.04 Wa	Ok
Set ROT status = **V** (invalid)	Check that ROT = default on VDL (default = -731.4 = -128)		Ok
	Check that ROT = default on VDO		Ok
	Check that ROT = default on MKD		Ok
ROT status = A (valid) ROT value = 0.0 degr./min Set Talker = HE	Check ROT = 0.0 on VDL		Ok
	Check ROT = 0.0 on VDO		Ok
	Check ROT = 0.0 on MKD		Ok
Change rate of turn to different values according to the check column and check the VDL value. Values have to be according to 6.10.3.6	9 converted to 0	Value is used	Acc.
	11 converted to 720	Value is used	Acc.
	- 9 converted to 0	Value is used	Acc.
	-11 converted to -720	Value is used	Acc.

7.5.12 Additional Tests

22.06.04 Wa	Test details – Additional Tests		
Test item	Check	Remark	Result
Apply simulated sensor sentences to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
Send sentences without checksum, check on VDL	Check position = default	Still valid values Retest 03.09.04 Wa	Ok
	Check SOG/COG = default		Ok
	Check heading = default		Ok
	Check ROT = default		Ok
Send sentences with false checksum, check on VDL	Check position = default		Ok
	Check SOG/COG = default		Ok
	Check heading = default		Ok
	Check ROT = default		Ok
Back to valid checksum Set baud rate of simulator to 38400 Bd, The purpose is to check if input survives wrong baudrate.	Check position = default		Ok
	Check SOG/COG = default		Ok
	Check heading = default		Ok
	Check ROT = default		Ok
Set baud rate of simulator and sensor input also to 38 400, check on VDL	Check position		Ok
	Check SOG/COG		Ok
	Check heading		Ok
	Check ROT		Ok

7.5.13 Compatibility check

For the practical use of AIS transponders mainly in case of retrofit it may make sense that the AIS transponder is compatible to older versions of IEC 61162.

Therefore we accept if an EUT evaluates also sentences according to IEC 61162 Eddition 1 (1995)

This is not a test of required functions of the EUT but a record of the capabilities of the AIS transponder.

Date	Result	Status
09.11.04 Ba	There is a configuration parameter “Modeless sentences”. If this parameter is set to “On” the modeless GLL and RMC sentences are usde by the EUT. After restart the parameter is automatically reset to “Off”. This is not acceptable because of the following situation: The unit has been installed on board, connected to a a sensor system applying modeless GLL or RMC, “Modeless sentences” is activated by the configuration setting, everything works fine, and the installer leaves the ship. Some days later the unit is restarted, maybe by short break of power supply. Now there is no position available because the modeless sentences are inactivated. Nobody knows why, and in worst case it is even not detected that the position is missing in the VDL transmissions Retest 22.11.04 Ba: no change Retest 24.11.04 Ba: The activation of the modeless sentences have been removed from the setting menu and therefore the modeless sentences cannot be activated and used. The error descriptions at the test items are therefore not relevant, but can be used for future implementation of the OSD sentence.	Ok

25.10.04 Wa	Test details – Compatibility check		
Test item	Check	Remark	Result
Apply simulated sensor sentences to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
GLL sentence Without mode indicator	Record if position is used	Pos not used Retest 09.11.04 Ba: The GLL data are used if the status is set to V (invalid) Retest 22.11.04 Ba: External GLL data are used (Status is set to external GNSS) but set to the default values (according to the invalid flag). So the internal the internal GPS position is not used although a valid position is available The MKD is switching between a internal position and invalid with a rate of 1 s	N/A
	Check that PA flag is set to 0		N/A
RMC sentence Without mode indicator	Record if position is used	Not used Retest 09.11.04 Ba: RMC sentence is used, is not used if status is set to V (invalid)	N/A
	Check that PA flag is set to 0		N/A
VTG sentence Without mode indicator	Record if SOG/COG is used	Retest 09.11.04 Ba: RMC sentence is used,	N/A
Priority check: • GGA sentence and • GLL sentence without mode indicator	Check that GGA sentence is used	EUT switch between GGA and GLL pos Retest 29.10.04 Ba: GLL sentence is used Retest 09.11.04 Ba: GGA sentence is not used Retest 22.11.04 Ba: GGA is not used, even if the GLL is set to invalid, the EUT uses default data and does not use the valid GGA and the position from internal GPS	N/A

	Check that data from GLL are not used	Data is used Retest 09.11.04 Ba: The GLL data are used, even if the status of GLL is set to V (invalid) Retest 22.11.04 Ba: The GLL data are used, even if the status of GLL is set to V (invalid), but now the EUT transmits the default position from the GLL	N/A

7.5.14 Check of different inputs

EUT is not able to handle 3 ports in parallel. If sensor data for all 3 ports are provided the data on port three are ignored by the system :

Retest 22.10.04 Wa : ok

22.06.04 Wa	Test details – Different inputs		
Test item	Check	Remark	Result
Apply simulated sensor sentences to the sensor inputs File name of 1st part is ais01_gll_vtg_hdt_rot.sst			
Connect simulator to sensor input 2. Change configuration according to the used input	Check position		Ok
	Check SOG/COG		Ok
	Check heading		Ok
	Check ROT		Ok
Connect simulator to sensor input 3. Change configuration according to the used input	Check position		Ok
	Check SOG/COG		Ok
	Check heading		Ok
	Check ROT		Ok
• Connect simulator output 1 to sensor input 1 and apply GLL and VTG. File name is ais10_gll_vtg.sst • Connect simulator output 2 to sensor input 2 and apply VBW . , File name is ais11_vbw.sst • Connect simulator output 3 to sensor input 3 and apply HDT and ROT. File name is ais12_hdt_rot.sst	Check position		Ok
	Check SOG and COG		Ok
	Check heading		Ok
	Check ROT		Ok

7.5.15 Sensor sentences overview

29.10.04 Ba	Supported sentences overview			
Sentence	Description	Required	Supported	Result
This list is derived from the results of the above tests of the single sentences for overview, not an additional test				
GLL	Geographical Latitude Longitude	required	Yes	Ok
GGA		optional	Yes	Ok
GNS		required	Yes	Ok
RMC		required (COG)	Yes	Ok
DTM		required	Yes	Ok
GBS		required	Yes	Ok
VTG	Velocity True Ground	optional	Yes	Ok
VBW	Velocity Bottom Water	required	Yes	Ok
OSD	Own Ship Data	optional	No	---
HDT	Heading	required	Yes	Ok
ROT	Rate of Turn	required	Yes	Ok

7.6 19.6 Test of high speed output

(7.6.3)

Method of measurement

Set_up standard test environment and simulate VDL-position reports using test system. Record output from the EUT high speed port (see table 11).

Required results

Verify that the recorded message contents agree with the simulated VDL contents (VDM) and own transmitted data (VDO) and in accordance with the sentence specifications of IEC 61162-1.

This contents of VDM and VDO are checked in

- 4.7.1 16.7.1 Received messages and
- 4.7.2 16.7.2 Transmitted Messages

7.6.1 VDM – Received message

	Test details – Content of received messages		
Test item	Check	Remark	Result
Transmit all types of messages from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Message id	8 binary broadcast message, multiy slot File name: AIBBM_multi_bin.sst		
Number of sentences	Check that value = 3		Ok
Check sentence number	Check that value = 1,2,3 according to length of message		Ok
Sequential message ident.	Check that counting from 0...9 modulo 10		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0 (msg length = 1008 bit)		Ok
Message id	Safety related broadcast message, multi slot File name: AIBBM_multi_safety.sst		
Number of sentences	Check that value = 3		Ok
Check sentence number	Check that value = 1,2,3		Ok
Sequential message ident.	Check that counting from 0...9 modulo 10		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2 (msg length = 1000)		Ok
	Additional checks		
Length of sentence	Confirm that no sentence exceeded the length of 82 character (no warning from monitor program)	The ACA output sentence exceeds the length of 82 characters. Reason is that the corner points are output in units of 1/100 min. It should be output in units of 1/10 min because the areas are defined in msg 22 and DSC also with this solution. Retest 17.06.04 Ba: Length of sentence is ok now	Ok
Checksum	Confirm that no sentence had a wrong checksum (no warning from monitor program)		Ok

7.6.2 VDO Transmitted messages

	Test details – Content of transmitted messages		
Test item	Check	Remark	Result
Transmit all applicable types of messages Check the field content of the fields listed under Test item.			
Message id	8 binary broadcast message, multiy slot File name: AIBBM_multi_bin.sst		
Number of sentences	Check that value = 3		Ok
Check sentence number	Check that value = 1,2,3 according to length of message		Ok
Sequential message ident.	Check that counting from 0...9 modulo 10		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 0 (msg length = 1008 bit)		Ok
Message id	Safety related broadcast message, multi slot File name: AIBBM_multi_safety.sst		
Number of sentences	Check that value = 3		Ok
Check sentence number	Check that value = 1,2,3		Ok
Sequential message ident.	Check that counting from 0...9 modulo 10		Ok
Channel	Check that the correct value A and B is output		Ok
Fill bits	Check that value = 2 (msg length = 1000 bit)		Ok
	Additional checks		
Length of sentence	Confirm that no sentence exceeded the length of 82 character (no warning from monitor program)		Ok
Checksum	Confirm that no sentence had a wrong checksum (no warning from monitor program)		Ok

7.7 19.7 High speed output Interface performance

(7.6.3)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Increase the VDL load to >90%. Record transmitted messages and check PI output of EUT on port for "external Display" and "auxiliary Display".

Required results

Confirm that EUT outputs all received messages to the PI. Repeat test for port "auxiliary display".

Date	Result	Status
18.06.04	Test over 20 minutes: 100 % on both channels	Ok (perfect)

7.8 19.8 Test of high speed input

(7.6.3)

Method of measurement

Set-up standard test environment. Apply simulated input data, in accordance with the sentence specifications of IEC 61162-1 and 7.6.3.3 table 10, to the EUT and record VDL output.

Required results

Verify that the VDL message contents agree with simulated input data.

Date	Format	Result	Status
28.10.04	**VSD**	See test details below Remark: VSD sentence is accepted only if a proprietary sentence has been sent before	See at details
28.10.04	**SSD**	See test details below Remark: SSD sentence is accepted only if a proprietary sentence has been sent before	See at details

All other sentences are tested in special test items

28.10.04 Ba	Test details – Evaluation of SSD sentence		
Test item	Check	Remark	Result
Apply an SSD sentence to an high speed input (PI)			
VDL transmission	Check that msg 5 is transmitted after change of data by SSD sentence		Ok
	Check that msg 5 is transmitted only if a field has been changed	Msg 5 is transmitted every time a SSD sentence is applied Retest 09.11.04 Ba: msg 5 is transmitted only if a field has been changed	Ok
Call sign	Check that the new call sign is transmitted in msg 5		Ok
	Check that the new call sign is displayed on MKD		Ok
Ship's name	Check that the new ship's name is transmitted in msg 5		Ok
	Check that the new ship's name is displayed on MKD		Ok
A – Distance from bow B – Distance from stern C – Distance from port D – Distance from starboard	Check that the new dimensions are transmitted in msg 5	The values of the SSD sentence are used for the internal reference position We recommend to use Source ID "GP" or other talker IDs of positioning system for external reference point and "AI" for the internal ref. point Retest 09.11.04 Ba: The SSD values are set according to the source identifier. A msg 5 is output, but with the old values. The reference data are not updated. All subsequent msg 5 contain the old values until the position source has been changed to the other source and back. Retest 22.11.04 Ba: The msg 5 contains the new data	Ok Ok
	Check that the new dimensions are displayed on MKD	Length and Beam is correct, The SSD values are set for the internal reference point, it should be used for the external Retest 09.11.04 Ba: The SSD values are set according to the source identifier field: AI : internal GPS GP: external EPFS (talker GP)	Ok

DTE indicator flag	Check if the DTE flag is entered in VDL message 5 Not required	DTE flag is defined only by supervision of connection to MKD	Ok

28.10.04 Ba	Test details – Evaluation of VSD sentence		
Test item	Check	Remark	Result
Apply an VSD sentence to an high speed input (PI)			
VDL transmission	Check that msg 5 is transmitted after change of data by VSD sentence		Ok
	Check that msg 5 is transmitted only if a field has been changed	Msg 5 is transmitted every time a SSD sentence is applied Retest 09.11.04 Ba: msg 5 is transmitted only if a field has been changed	Ok
Navigational status	Check that the new Navigational status is transmitted in msg 1		Ok
	Check that the Navigational status is displayed on MKD		Ok
Type of ship and cargo	Check that the new type is transmitted in msg 5		Ok
	Check that the new type of ship is displayed on MKD		Ok
Maximum actual static draught	Check that the new draught is transmitted in msg 5		Ok
	Check that the new draught is displayed on MKD		Ok
Destination	Check that the new destination is transmitted in msg 5		Ok
	Check that the new destination is displayed on MKD		Ok
Estimated Time of Arrival (ETA)	Check that the new ETA is transmitted in msg 5		Ok
	Check that the new ETA is displayed on MKD		Ok
Regional application flag	Check if the regional application flag is entered in VDL message 1		Ok
Persons on board	Check if the persons on board are displayed on MKD Not required		Ok

8 20 DSC functionality tests

(M.1371 A3)

8.1 20.1 General

(M.1371 A3/1)

(a) For the tests in this clause, set the EUT into autonomous mode using channels AIS1 and AIS2 with a reporting interval of 2 s (for method of measurement see also IEC 61993-1).

(b) Check with a sequence of valid calls consisting of a test signal number 1, a geographic call from ITU-R M.493, a test signal number 1, an individual call from ITU-R M.493 and a test signal number 1 that the EUT correctly receives and processes the three tests calls and its correct AIS operation is not affected by the interleaved calls.

(c) Check that the EUT does not respond to invalid calls - incorrect MMSI, position outside addressed geographic area, different course, or ship's type.

(d) Send to the EUT a standard test signal number 1 but with symbol numbers 104 and 03 followed by values 01 and 120 (Activate alternate system with group number 1 and sequence number 120). Check that the EUT does not respond.

06.05.04 Ba	Test details – General DSC functions check		
Test item	Check	Remark	Result
This is a first check that DSC transmission, reception and addressing is working in principle. Special addressing and data content checking is done in special tests			
Start DSC transmission of Test signal 1 (Position and name request) File name is "eut\Test_Signal_1.sst"	Check that the call is answered -> Contents are checked in a special test		Ok
Start DSC transmission of area addressed call (Position and name request) File name is "area_pos_name_rq.sst"	Check that the call is answered within 20 s Contents are checked in a special test		Ok

06.05.04 Ba	Test details (b) – Sequence of 5 calls		
Test item	Check	Remark	Result
Set reporting interval to 3 s and record VDL			
Start DSC transmission of test sentence File name is "eut\Sequence_20_1.sst" Delay between the calls is 3 s	Check that the three test signal 1 calls are acknowledged		Ok
	Check that the two M.493-calls are not acknowledged		Ok
	Check that the schedule of the AIS position reports is not changed by the transmission of the DSC calls		Ok
Increase the channel load so that there are no 20 free succeeding slots (1 position report every 5 s) Transmit test signal 1	Check that no responses are transmitted by the EUT	Responses are transmitted Retest 18.08.04 Ba: No responses	Ok

06.05.04 Ba	Test details (c), (d) – Check of addressing		
Test item	Check	Remark	Result
Start DSC transmission of Test signal 1 (Position and name request) File name is "eut\Test_Signal_1.sst" Change MMSI according to the test item			
With correct MMSI	Check that the call is answered		Ok
Change MMSI to not matching value	check that call is not answered		Ok
Start DSC transmission of area call (Position and name request) File name is "area_pos_name_rq.sst" Change position, course and type of ship according to the test item			
Position inside area	Check that the call is answered within 20 s		Ok
Change position to outside the area,	check that call is not answered		Ok
Position inside area again, add course matching the course of ship,	check that call is answered		Ok
Change course to a value differing > 2 degrees	Check that call is not answered	Course in DSC call: 350 Response at ship's course of 346,347,348,349,350, Shoud responde on 348, 349, 350, 351, 352 Retest 18.08.04 Ba: Response on courses 348 ...352	Ok
Delete course, add matching type of ship	check that call is answered		Ok
Change type of ship to All ships	check that call is answered	No response,	

of this type		It should be possible to address all ships of a type, independent of the type of cargo Retest 18.08.04 Ba: EUT responses on a call to all ships of this type (type of ship = 72, calling 70)	Ok
Change type of ship	Check that call is not answered		Ok
Position inside area , area now in a critical region (lon about 180 degr.) File name =area_pos_name_rq_180.sst	Check that the call is answered within 20 s		Ok
Change position to outside the area,	check that call is not answered		Ok
Start DSC transmission of Selective call with command “Activate alternate system” File name is “eut\sel_act_alt_system.sst”			
Sel. Call with symbols: 104+03+01+120 (68+03+01+78)hex	Check that EUT does not transmit a response		Ok

8.2 20.2 Regional area designation

(M.1371 A3/5)

Perform the test specified in 17.2 using the following DSC command:

Send to the EUT a standard test signal number 1 but with symbol numbers appropriate to the geographical regions and channels specified in the test. Note the transition boundary is 5nm in this test.

18.06.04 Ba	Test details – Regional area designation		
Test item	Check	Remark	Result
Send a selective region setting call File name “eut\sel_set_region.sst”	Check that an acknowledgement is received		Ok
	Check that an ACA sentence is output at PI port		Ok

	Check that new region is stored in the region list of the EUT	There is not a new region stored but the channels of the area in use (not overlapping the new area) are changed to the channels of the DSC call. This would be ok if the DSC included only the channels but no corner points of an area. In this test a complete area setting was transmitted. Retest 18.08.04 Ba: No change. Retest 15.09.04 Ba: The new area is stored as an additional area	Ok
	Check that transition zone is 5 nm	The TZ size is not 5 Nm but the TZ size of the existing active area (4 Nm). Retest 18.08.04 Ba: The TZ size of the active area is changed from 2 to 4. Retest 15.09.04 Ba: The TZ size of the new area is 5	Ok
Send a area addressed region setting call File name “area_set_region.sst”	Check that an acknowledgement is received		Ok
	Check that an ACA sentence is output at PI port		Ok
	Check that new region is stored in the region list of the EUT	Same as with selective call Retest 18.08.04 Ba: No change, same as before and as with selective call Retest 15.09.04 Ba: The new area is stored as an additional area	Ok
Send a selective call with channel setting in the area in use. File name”eut\sel_set_ais_channel_65.sst”	Check that an acknowledgement is received		Ok
	Check that AIS channels are set according to the call content		Ok
	Check that new AIS channels are used for transmission and reception		Ok

18.06.04 BA	Test details – Channel management test of 17.2		
Test item	Check	Remark	Result
Set-up EUT in autonomous mode transmitting on channel AIS1/AIS2, send 2 DSC messages, defining 2 adjacent areas with channels A1, B1 and A2, B2. File name is area_set_region_20_2.sst Use external sensor input to simulate a voyage through both areas. Set the position outside the areas. Set the positions near the limits of the transitional zones to check the dimensions. The transitional zone is 5 nm by default			
MKD display defined area	Check that the defined areas are correctly displayed on MKD or output as ACA on request	Areas are correctly output on ACA requests	Ok
Item 1:	Check that channels AIS1 and AIS2 are in use		Ok
Item 2: Move position into transitional area of region 2	Check that EUT keeps old channels for 1 min. timing out the transmissions of AIS2		Ok
	Check that channel AIS 1 and A2 are used		Ok
	Check that reporting rate is doubled		Ok
Item 3: Move position into region 2	Check that EUT keeps transtional channels for 1 min. timing out the transmissions of AIS 1		Ok
	Check that channel A2 and B2 are used		Ok
	Check that reporting rate is changed back to normal reporting rate		Ok
Item 4: Move position into transitional area between region 1 and 2	Check that channels A2 and A1 are used		Ok
	Check that reporting rate is doubled		Ok
Item 5: Move position into region 1	Check that channels A1 and B1 are used		Ok
	Check that reporting rate is changed back to normal reporting rate		Ok
Move position into transitional area of region 1	Check that channels A1 and AIS1 are used		Ok
	Check that reporting rate is doubled		Ok
Move position out of the transitional zone of region 1	Check that channels AIS1 and AIS2 are used		Ok
	Check that reporting rate is changed back to normal reporting rate		Ok

8.3 20.3 Scheduling

(M.1371 A3/2)

Check that the time sequence of the TDMA messages is not changed when the EUT transmits a DSC signal.

Send a valid geographical call to the EUT. Check that the response is transmitted after a random delay distributed over the range of 0 to 20 s and subject to the restrictions of ITU-R M.1371 A3/2.2..

Send a valid geographical call to the EUT followed by a signal consisting of test signal 1 with a signal level of -107 dBm at the receiver input of 25 s duration. Check that the response is not transmitted.

18.06.04 Ba	Test details – Scheduling		
Test item	Check	Remark	Result
Set reporting interval to 2 s and record VDL			
Start DSC transmission of test signal 1 File name: “eut\test_signal_1.sst” Delay between calls is 3 s	Check that the schedule of the AIS position reports is not changed by the transmission of the DSC calls		Ok
Send area addressed calls with a rate of 30 s for about 30 min. File name is “area_pos_name_rq.sst”	Record the transmissions and responses with time stamp and enter delay times in a prepared Excel sheet. Add diagram and check times	There were a few responses exceding the 20 s range by a few seconds.	Acc
Start DSC transmission Test sequence 20.3 (Area call + 25 s test signal 1) File name: “test_sequence_20_3.sst”	Check that EUT does not transmit a response	Test 06.05.04 Tested 5 times	Ok

8.4 20.4 Polling

(M.1371 A3/3)

(a) Check that the EUT is capable of receiving, processing and automatically transmitting a response to the following calls from ITU-R M.825: 101 (command to duplex-channel), 102, 103, 108, 109, 111, 112, and 116. The sequence of calls consisting of test signals number 1 and valid geographic calls shall demonstrate the capability of the EUT to operate on single frequency channels as well as on two frequency channels.

(b) Verify through this test, that ships maritime mobile service identify (MMSI), ship name, ships length and type of ship is programmed into the EUT.

(c) Send a standard test signal number 1 with additional symbols number 109 and 116 and check that the reply messages 100, 119 and 120 are programmed automatically.

(d) Check that when information is not available to respond to a command the transmitted response is followed by the symbol 126.

(e) Send a standard test signal number 1 with additional symbol 101 followed by channel number 87. Repeat the test with channel number 88 and with symbol 104 and 00 followed by channel number 2087 and 2088. Check in all cases that the response is made on channel 70.

(f) Send a DSI sentence to CH 4 and CH 5 (see annex D) with an individual station address and with command sets 103 (report your position) and 111 (report ship name). Check that the EUT does not transmit a DSC message.

(g) Set the RF output power of the EUT high / low using the appropriate DSC command. Check that the output power is set accordingly.

06.05.04 Ba	Test details (a),(b),(c) – Information polling		
Test item	Check	Remark	Result
Start DSC transmission of Test signal 1. File name is "eut\Test_Signal_1.sst". Modify sentence according test item			
Set channel (101+xx) (101+ch 76) (65h+4Ch)	Check that direct answer on channel xx		Ok
	Check if following answers on channel xx		Ok
Request automatic position report (102+xx) (66 xx) hex	Check that immediate response with EOS=BQ is received	EOS = RQ Retest 18.08.04 Ba: EOS = BQ	Ok
	Check automatic reporting rate		Ok
	Check that further TX are transmitted with EOS = RQ (117)		Ok
	Check that automatic reporting is finished after 5 transmissions (without ackn. by base station)		Ok
	Check that the automatic reporting is not finished with ackn. by base station.	Automatic report is finished. Information required which items of the ackn are checked, and information about time-out of ackn. Retest 18.08.04 Ba: Automatic position report is continued when ackn. with the original call content and with symbol 110.	Ok
Send message with 102+00 (66 00) hex	Check that the automatic position report is finished	The automatic position report is finished The call was not acknowledged allthough the EOS was RQ Retest 18.08.04 Ba: Call is acknowledged, Message = symbol 110 We recommend to acknowledge with the original call content (102 + 00).	Ok

		Retest 15.09.04 Ba: The call is acknowledged with the original call content	Ok
Request position (103) (67 hex)	Check position in response		Ok
	Check time		Ok
	Check type of ship		Ok
Request length of ship (108=6Ch)	Check length of ship (124=7Ch)		Ok
Request course (109=6Dh)	Check course (119=77h)		Ok
Request ships name (111=6Fh)	Check name (115=73h)		Ok
Request ackn. (112=70h)	Check ackn. (110=6Eh)		Ok
Request speed (116=74h)	Check speed (120=78h)		Ok
(C) Request test signal 1 (pos, name request) + 109 + 116 (6F 67 6D 74))	Check automatic response submitting • name (115=73h), • position (100=64h), • course 119=77h) and • speed (120=78h)		Ok
Send • modified test signal 1 (101+72)=(65h+48h) (set DSC channel to a simplex channel) + • Geographically addressed call. File: sel_check_channel.sst	Check that the communication on selected simplex channel is working	Test 18.08.04 Ba	Ok
Send • Modified test signal 1 (101+60) =(65h+3Ch) (set DSC channel to a duplex channel) + • Geographically addressed call.	Check that the communication on selected duplex channel is working	Test 18.08.04 Ba	Ok
	Check that the AIS transmits on the ship station frequency of the duplex channel (lower band frequency)	Test 18.08.04 Ba: EUT transmits on the upper band frequency (shore station frequency) Retest 15.09.04 Ba: The lower band (ship station) frequency is used	Ok

06.05.04 Ba	Test details (d) – polling, information not available		
Test item	Check	Remark	Result
Start DSC transmission of Test signal 1. File name is "eut\Test_Signal_1.sst" Change request symbols according to the test item.			
Request position (103 = 67h)	Check response = (100+126) = (64 7E)h		Ok
Request length of ship (108 = 6Ch)	Check length of ship (124+126) = (7C 7E)h	Test 18.08.04 Ba	Ok
Request course (109 = 6Dh)	Check course (119 + 126) = (77 7E)h		Ok
Request ships name (111 = 6Fh)	Check name (115 + 126) = (73 7E)h	Test 06.05.04 Ba	Ok
Request speed (116 = 74h)	Check speed (120 + 126) = (78 7E)h		Ok

06.05.04 Ba	Test details (e) – Use of AIS channels for DSC		
Test item	Check	Remark	Result
Start DSC transmission of Test signal 1. File name is "eut\Test_Signal_1.sst". Modify sentence according test item			
Set channel (101+87) (65 57) + 67 (pos requ.)	Check that response is transmitted on channel 70		Ok
Set channel (101+88) (65 58) + 67	Check that response is transmitted on channel 70		Ok
Set channel (104+00+2087) (68 00 14 57) + 67	Check that response is transmitted on channel 70	There is a DSC transmission but not on channel 70 Retest 18.08.04 Ba: Response on channel 70	Ok
Set channel (104+00+2088) (68 00 14 58) + 67	Check that response is transmitted on channel 70	There is a DSC transmission but not on channel 70 Retest 18.08.04 Ba: Response on channel 70	Ok

06.05.04 Ba	Test details (f) – DSI sentence check		
Test item	Check	Remark	Result
Apply DSI sentence to the PI interface. File name is ais_dsi.sst			
ON CH4 = PI interface	Check that the EUT does not transmit a DSC message.		Ok

06.05.04 Ba	Test details (g) – Power setting check		
Test item	Check	Remark	Result
Start DSC transmission of Test signal 1. File name is “eut\Test_Signal_1.sst”. Modify sentence according test item			
Ad symbols to set power = 2 watt (low power) (Symbols 104+ 01+ 02) (68 01 02) h	Check that response is transmitted with low power		Ok
Request position (103 = 67 h)	Check that response is transmitted with low power		Ok
Ad symbols to set power = 12.5 watt (high power) (Symbols 104+ 01+ 12) (68 01 0C) h	Check that response is transmitted with high power		Ok
Request position (103 = 67 h)	Check that response is transmitted with high power		Ok

9 21 Long Range functionality tests

(9)

9.1 21.1 LR interrogation

(9.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Apply a LR addressed interrogation message to the LR-interface port of EUT; Record LR output port and AIS high-speed output port Set EUT to

- *Automatic response*
- *Manual response via MKD*
- *Manual response via PI*

Required results

Check that EUT displays LR interrogation messages and sends to PI.

Check that EUT outputs a LR position report message

- *Automatically (and indicates action on display)*
- *After manual confirmation via MKD*
- *After manual confirmation via PI*

14.09.04 Ba	Test details – LR automatic response, all data		
Test item	Check	Remark	Result
Set EUT to automatic response. Apply an addressed request to the LR port of EUT requesting all possible information File name: LRI_LRF_MMSI_all.sst			
Response	Check that a response is output on LR port	Test 18.06.04 Ba: I did not get any response Retest 14.09.04 Ba: There is a response now	Ok
Display on MKD	Check that the request is displayed on MKD	There is a message (letter) symbol displayed on the MKD until the operator reads the request in the list of received messages Retest 25.10.04 Wa because of extrem low contrast the symbol is not readable Retest 29.10.04 Ba: Contrast of symbol is now very high!	Ok
	Check that replay status is displayed on MKD	Displayed by an “A” in the message list.	OK

PI output	Check that LR interrogation and response is output on PI		Ok
Contents of LRF response	Check output of LRF sentence		Ok
	Check that sequence number = request		Ok
	Check MMSI = requestor		Ok
	Check name of requestor		Ok
	Check function request = request		Ok
	Check that function reply is according to the availability of data (2=avail, 3= not av.)	All information available	Ok
Contents of LR1 response	Check output of LR1 sentence		Ok
	Check that sequence number = request = LRF		Ok
	Check MMSI of responder = own MMSI		Ok
	Check MMSI of requestor		Ok
	Check ship's name		Ok
	Check Call sign		Ok
	Check IMO number		Ok
Contents of LR2 response	Check output of LR2 sentence		Ok
	Check that sequence number = request = LRF		Ok
	Check MMSI of responder = own MMSI		Ok
	Check date, UTC		Ok
	Check Lat, Lon		Ok
	Check COG		Ok
	Check SOG		Ok
Contents of LR3 response	Check output of LR3 sentence		Ok
	Check that sequence number = request = LRF		Ok
	Check MMSI of responder = own MMSI		Ok
	Check destination		Ok
	Check ETA	The year is 15 instead of 04, other data are ok Retest 25.10.04 Wa	Ok
	Check draught		Ok
	Check ship/cargo		Ok
	Check length of ship		Ok
	Check breadth of ship		Ok
	Check ship type		Ok
	Check persons		Ok

25.10.04 Wa	Test details – LR automatic response, selected data		
Test item	Check	Remark	Result
Set EUT to automatic response. Apply an addressed request to the LR port of EUT requesting selected information File name: LRI_LRF_MMSI_all.sst, modified by deleting not requested information			
Request A Name Call sign IMO number	Check that only LF and LR1 is transmitted		Ok
	Check that function request field = request		Ok
	Check that function reply status field matches request and data availability		Ok
	Check that the requested fields are not empty		Ok
Request A,E,F Name Call sign IMO number COG SOG	Check that LRF, LR1 and LR2 is transmitted		Ok
	Check that function request field = request		Ok
	Check that function reply status field matches request and data availability		Ok
	Check that requested fields are provided		Ok
	Check that only requested fields are not empty		Ok
Request C,E,F Position COG SOG	Check that LRF, LR1 and LR2 are transmitted		Ok
	Check that function request field = request		Ok
	Check that function reply status field matches request and data availability		Ok
	Check that requested fields are provided		Ok
	Check that only requested fields are not empty		Ok
Request P,W Ship/cargo Persons	Check that LRF, LR1 and LR3 is transmitted		Ok
	Check that function request field = request		Ok
	Check that function reply status field matches request and data availability		Ok
	Check that requested fields are provided		Ok
	Check that only requested fields are not empty		Ok

25.10.04 Wa	Test details – Manual Confirmation		
Test item	Check	Remark	Result
Set EUT to manual response. Apply an addressed request to the LR port of EUT requesting all possible information File name: LRI_LRF_MMSI_all.sst			
Display on MKD	Check that the request for manual response is displayed on MKD		Ok
	Check that response is transmitted after manual confirmation on MKD		Ok

28.10.04 Ba	Test details – Confirmation via PI		
Test item	Check	Remark	Result
Set EUT to external or manual confirmation as implemented Apply an addressed request to the LR port of EUT requesting all possible information File name: LRI_LRF_MMSI_all.sst			
Confirmation via PI	Check that the request for manual response is output on PI (Copy of long range request input)		Ok
	Check that response is transmitted after external confirmation via PI using the LRF sentence		Ok

9.2 21.2 LR "all ships" interrogations

(9.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Apply a LR "all ships" interrogation message to the LR-interface port of EUT defining a geographical area which contains own ships position; Record LR output port. Set EUT to

- *Automatic response*
- *Manual response.*

Repeat check with own ship outside specified area.

Required results

Check that EUT outputs a LR position report message

- *Automatically (and indicates action on display)*
- *After manual confirmation.*

No response shall be output on the repeat check.

25.10.04 Wa	Test details – Area addressing - Automatic response		
Test item	Check	Remark	Result
Set EUT to automatic response Apply an area addressed request to the LR port of EUT requesting position and speed information			
Own position in Area File name: LRI_LRF_area_CEF.sst	Check that the request is automatically responded		Ok
	Check that the request and response status is displayed on MKD		Ok
	Check that the request and response is output on PI		Ok
Own position not in Area File name: LRI_LRF_out_area_CEF.sst	Check that the request is not responded		Ok
	Check that the request is not displayed on MKD		Ok
	Check that the request is not output on PI		Ok

25.10.04 Wa	Test details – Area addressing – Manual confirmation		
Test item	Check	Remark	Result
Set EUT to manual response Apply an area addressed request to the LR port of EUT requesting position and speed information			
Own position in Area File name: LRI_LRF_area_CEF.sst	Check that the request is displayed on MKD		Ok
	Check that response is transmitted on confirmation on MKD		Ok
	Check that the request and response is output on PI		Ok
Own position not in Area File name: LRI_LRF_out_area_CEF.sst	Check that the request is not displayed on MKD		Ok
	Check that the request is not output on PI		Ok

9.3 21.3 Consecutive LR "all ships" interrogations

(9.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Set EUT to automatic mode. Apply 5 LR "all ships" interrogation messages to the LR-interface port of EUT defining a geographical area which contains own ships position;

Record LR output port. Set the control flag in the LRI message to

- *0 (reply on first interrogation only)*
- *1 (reply on all applicable interrogations)*

Required results

Check that EUT outputs a LR position report message

- *On the first interrogation only*
- *On all interrogations.*

25.10.04 Wa	Test details – Area addressing - Automatic response		
Test item	Check	Remark	Result
Set EUT to automatic response Apply some area addressed requests to the LR port of EUT requesting position and speed information File name: LRI_LRF_area_CEF.sst			
Control flag = 1 (reply on all requests)	Check that the 1. request is automatically responded		Ok
	Check that the following interrogations are responded		Ok
Control flag = 0 (reply only on first request) Change MMSI to get the first response	Check that the 1. request is automatically responded		Ok
	Check that the following interrogations are not responded		Ok
	Check that the following interrogations are not displayed on MKD		Ok
	Check that the following interrogations are not output on PI		Ok