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: **MDS AIS transponder**

Type: **AIMS MIV**

Applying test standards:

IEC 61993-2	Sections 14, 16-21

Test Report No.: 734.2/0045-1/2003/ S3220

Applicant: Marine Data Systems (Pty) Ltd
Kyalami Park, 580 Kyalami Boulevard
Midrand
South Africa

Hamburg, 4. Feb. 2003
Federal Maritime and
Hydrographic Agency

by order

Bartels
Test engineer

by order

Preuss
Head of
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nach DIN EN 45001
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Deutscher Akkreditierungs Rat
DAR
DAT-P-086/98-00

Version 1.27

Translation

Deutsche Akkreditierungsstelle Technik (DATech) e.V.

represented in the

Deutschen AkkreditierungsRat

Akkreditierung

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

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Bernhard-Nocht-Straße 78
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Frankfurt/M., Dec. 23rd, 1998

Managing Director
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Bundesamt für Seeschifffahrt und Hydrographie
Federal Maritime and Hydrographic Agency

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

General

Applicant: Marine Data Systems (Pty) Ltd
Kyalami Park, 580 Kyalami Boulevard, Midrand, South Africa

Equipment under test:

Type: AIMS MIV

Manufacturer: Marine Data Systems (Pty) Ltd
Kyalami Park, 580 Kyalami Boulevard, Midrand, South Africa

Place of test: BSH test laboratory Hamburg, Room 916

Start of test: 11 July, 2002

End of test: 15. December, 2002

Test standards[1]:

IEC 61993-2 (2002)
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)[2]
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.
[2] functionally passed; interface hardware of high speed ports is compliant to IEC61162-1

1 General

1.1 Components of the equipment under test

	Type/denotation	Serial no.
component 1	AIMS MIV (1101-0010) Main Unit	020002651
component 2	KDU 1805 Keyboard / Display Unit	S/N 4345700004

1.2 Technical Data

Mobile station:			**Mobile station:**		
Transponder			**Transponder**		
Delivery date	01.07.2002		Delivery date	01.07.2002	
Transponder:	AIMS MIV		Transponder:	AIMS MIV	
Part No.:	Demonstration unit		Part No.:	Demonstration unit	
Serial No.:	020002651		Serial No.:	020002651	
SW Version:	Delivery	17.7.02	SW Version:	Delivery	
	Installation	17.7.02		Installation	
	No.	MCM MOB02.00 SCM MOB02.00 TCM REL02.00 RCM1 REL02.00 RCM2 REL02.00 RCM3 REL02.00		No.	
SW Version:	Delivery	27.7.02	SW Version:	Delivery	
	Installation	27.7.02		Installation	
	No.	MCM MOB02.01 SCM MOB02.01		No.	
SW Version:	Delivery	4.9.02	SW Version:	Delivery	
	Installation	4.9.02		Installation	
	No.	MCM MOB02.03 SCM MOB02.03		No.	
SW Version:	Delivery	10.9.02	SW Version:	Delivery	
	Installation	10.9.02		Installation	
	No.	MCM MOB02.04 SCM MOB02.04		No.	
SW Version:	Delivery	22./23. 09.02	SW Version:	Delivery	
	Installation	26.09.02		Installation	

	No.	MCM MOB02.05 SCM MOB02.05 TCM REL02.01		No.	
SW Version:	Delivery	27.09.02	SW Version:	Delivery	
	Installation	09.10.02		Installation	
	No.	MCM MOB02.06 SCM MOB02.06		No.	
SW Version:	Delivery	25.10.02	SW Version:	Delivery	
	Installation	26.10.02		Installation	
	No.	MCM MOB02.10 SCM MOB02.10 TCM REL02.02		No.	
SW Version:	Delivery	04.11.02	SW Version:	Delivery	
	Installation	04.11.02		Installation	
	No.	MCM MOB02.11 SCM MOB02.11		No.	
SW Version:	Delivery	25.11.02	SW Version:	Delivery	
	Installation	25.11.02		Installation	
	No.	MCM MOB02.13 SCM MOB02.13 TCM REL02.04		No.	
SW Version:	Delivery	05.12.02	SW Version:	Delivery	
	Installation	05.12.02		Installation	
	No.	MCM MOB02.17 SCM MOB02.17 (TCM REL02.04) RCM1 REL02.01 RCM2 REL02.01 RCM3 REL02.01		No.	
SW Version:	Delivery	11.12.02	SW Version:	Delivery	
	Installation	11.12.02		Installation	
	No.	MCM MOB02.18 SCM MOB02.18 TCM REL02.05		No.	
SW Version:	Delivery	12.12.02	SW Version:	Delivery	
	Installation	12.12.02		Installation	
	No.	MCM MOB02.20 SCM MOB02.20		No.	
SW Version:	Delivery		SW Version:	Delivery	
	Installation			Installation	
	No.			No.	
HW Version:			HW Version:		

MKD				MKD			
Delivery date	01.07.2002			Delivery date	01.07.2002		
Type:	KDU1805			Transponder:	KDU1805		
Part No.:	Code 80 150 500			Part No.:	Code 80 150 500		
Serial No.:	S/N 4345700004			Serial No.:	S/N 4345700004		
SW Version:	Delivery			SW Version:	Delivery		
	Installation	17.07.02			Installation		
	No.	KDU 02.01			No.		
SW Version:	Delivery			SW Version:	Delivery		
	Installation	27.07.02			Installation		
	No.	KDU 02.04			No.		
SW Version:	Delivery			SW Version:	Delivery		
	Installation	11.09.02			Installation		
	No.	KDU 02.05			No.		
SW Version:	Delivery	25.10.02		SW Version:	Delivery		
	Installation	26.10.02			Installation		
	No.	KDU 02.17			No.		
SW Version:	Delivery	07.11.02		SW Version:	Delivery		
	Installation	08.11.02			Installation		
	No.	KDU 02.18			No.		
SW Version:	Delivery	25.11.02		SW Version:	Delivery		
	Installation	25.11.02			Installation		
	No.	KDU 02.22			No.		
SW Version:	Delivery	05.12.02		SW Version:	Delivery		
	Installation	05.12.02			Installation		
	No.	KDU 02.23			No.		
SW Version:	Delivery			SW Version:	Delivery		
	Installation				Installation		
	No.				No.		
GPS Antenna				**VHF Antenna**			
Type:	Furuno			Type:	Procom		
Part No.:	GPA 016			Part No.:	CXL 2-1		
Ser. No.:				Ser. No.:			

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
Dev	slight deviation, no change required
Nok	Test of a required item was not successful, change required
Rec	It is recommended to make a change.
???	temporarily, has to be clarified or discussed

1.4.1 Notes on general problems

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

	General problems		
Date	**Item**	**Remark**	**Result**
11.09.02	Irregular transmissions	The EUT transmits position reports in a irregular kind, about 4...8 transmissions with an update rate of more than 1 per second one channel, then repeats this some seconds later on the other channel, and so on. All messages are of type 3 The VDO output is according the transmissions. Start at 08:34:14 UTC 26.11.02 Not observed again	ok
10.10.02	Use of channels in area setting	If the EUT is moved directly into an operational area with channel settings the channel use is like in the transitional zone, 1 default channel and 1 channel of the area is used. The same happens if the EUT is switched on within such an area. If the position is moved through the transitional zone it seems to be ok, and both channels of the area are used. 26.11.02 Retest: The correct channels of the area are used for Tx and Rx	ok
10.10.02 08.11.02	ACA output	Please check the <cr> <lf> of the ACA output. Our monitor program always displayes the ACA and ACS sentence in one line indicating that there is no complete <cr><lf> end of the ACA sentence Retest: ok 26.11.02 Retest: Same problem as at 10.10.02 again. This problem only applies to to the empty ACA sentences. 05.11.02 Retest: ok	ok

10.10.02 08.11.02	Restarting	After applying an ACA sentence with channel setting and disconnection of GPS the EUT seems to continously restart. I supply a logfile of PI output in this state. Switching power off and on does not help. Continuation of testing is not possible. Retest: Same as next item.	 ok
30.10.02 08.11.02	Restarting	During test of regional settings (17.2) the EUT has got the state in which it restarts every few seconds. Retest: Problem was caused by invalid GLL sentence (missing decimal point in Lat/Lon). Has been improved	 ok
06.12.02 13.12.02	Moving out of area	After moving the position directly out of an area the EUT was totally confused. It transmitted a lot of irregular msg 3 an did not come back to a regular autonomous mode with msg 1. A log output of PI port is provided. The log has been started some time after moving out of the area. Repetition of moving out of area was ok. There is a declaration from MDS that this problem has been found and fixed. A retest showed no problem.	 ok

1.5 4.3 Manuals

1.5.1 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.

18.11.02	**Test details – General documentation**		
Test item	**Check**	**Remark**	**Result**
Description of AIS	Check that a 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.	In technical manual	ok
Operating information	Check that an operating manual is included	Available for KDU; Switching the KDU off or in Stby does not switch off the AIS. Needs explanation in the manual. 19.12.02 Retest: Is explained now in the KDU Operatior's Manual	ok
Technical information	Check that a technical manual is included		ok
Installation information	Check that an installation manual is included	Installation description is part of the Technical Manual In addition there is a Interface Design Description	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

18.11.02	**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		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 applicable	
Retrieval of event log data (see 2.5)	Retrieval of event log data using PC and external software needs description	Event log can be displayed with the AIMS utility software. A manual of this software is available	ok

1.5.2 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.

	Test details – Requirements of Interface documentation		
Test item	**Check**	**Remark**	**Result**
a) A and B signal lines	Check that identification of A and B signal lines is included	The signal lines are generally indicated as lines A, B and C	Ok
b) Output driver	Check that the output drive capability is included	In technical Manual	Ok
c) Talker sentences of PI ports	Check that list of sentences is included		Ok
	Check that unused fields are noted	There is no information of used and unused fields. This is acceptable because all fields have to be provided	Acc
	Check if proprietary sentences are included if available	Proprietrary sentences are available and described	ok
c) Talker sentences of long range port	Check that list of sentences is included		Ok
	Check that unused fields are noted	There is no information of used and unused fields. This is acceptable because all fields have to be provided	Acc
	Check if proprietary sentences are included if available	Proprietrary sentences are available and described	ok
d) Input load	Check that the input load is included	In technical Manual	Ok
e) Input sentences of PI ports	Check that list of sentences is included		Ok
	Check that required and unused fields are noted	There is no information of used and unused fields. This is acceptable because all fields have to be used	Acc
	Check if proprietary sentences are included if available	Proprietrary sentences are available and described	ok
e) Input sentences of long range port	Check that list of sentences is included		Ok
	Check that required and unused fields are noted	There is no information of used and unused fields. This is acceptable because all fields have to be provided	Acc
	Check if proprietary sentences are included if available	Proprietrary sentences are available and described	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	According to Technical Manual the 3 sensor inputs are interchangable. Therefore not different lists required	Ok
	Check that required and unused fields are noted		Ok
	Check if proprietary sentences are included if available	No proprietary sentences	ok
f) Software version	Check that the relevant software version is included	Documented and identified together with main software	Ok
f) Hardware version	Check that the relevant hardware version is included	Documented and marked together with system hardware	Ok
g) Hardware input/output circuit	Check that information about hardware interface components is included		ok
h) Standards	Check that the version number and date of update of the relevant standard is included		Ok

2 14 Operational tests

2.1 14.1 Operating modes / Capability

(4.2)

2.1.1 14.1.1 Autonomous mode

(4.2.1, M.1371 A2/3.3.5)

2.1.1.1 14.1.1.1 Transmit Position reports

Method of measurement

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

Required results

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

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

- Reporting rate
- Message contents
- Slot use

are done in special test items.

17.07.02	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

Date	Result	Status
17.07.02	Test ok	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.

17.07.02	**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

17.07.02	**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

Date	**Result**	**Status**
17.07.02	Test ok	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.

	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); autonomous report rate 10 s			
Message type	Check that message type of position report is 2		Ok
First message	Check that first message is sent after 40 slots		ok
Alternating channels	Check that position report is sent alternating on channel A and B		ok
Reporting rate	Check that the reporting rate is 125 slots (18 msg/min) or 250 slots (9 msg/min) per channel	Slot distance is 124/126/124/126 ... 250 slots per channel is ok 05.09.02 Retest: ok now	ok
Record switch back time	Check that EUT reverts to SOTDMA msg 1 within 4 to 8 min		ok

	Test details b)– Reporting rate		
Test item	**Check**	**Remark**	**Result**
Send an assignment message 16 with offset = reporting rate of 300msg/10 min, increment=0			
Message type	Check that message type of position report is 2 instead of msg 1		ok

Alternating channels	Check that position report is sent alternating on channel A and B		ok
Reporting rate	Check that the reporting is 30msg/frame = 2 s		ok
Record switch back time	Check that EUT reverts to SOTDMA msg 1 within 4 to 8 min		ok

Date	Result	Status
17.07.02 05.09.02	See detailed test in see 4.6.4 (16.6.4 Assigned operation). for failure Retest ok	 ok

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.

18.07.02	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,000005002,3,,,,,, 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	The message ID 1.2 and destination 2 are not empty as requested by ACA sentence Retest 22.8.02 changed	ok
AIABK acknowledgement	Record and check the AIABK acknowledgement	$AIABK,000008001,A,15,0,3 The field "Message Sequence Number" should by empty (null field), not the number 0. Retest 22.8.02 changed	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

18.08.02	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,000005002,5,,,,,, A response is automatically transmitted by the addressed transponder			
VDO output of EUT	Check the VDO output on PI	See msg 3 interrogation	ok
AIABK acknowledgement	Record and check the AIABK acknowledgement	See msg 3 interrogation	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

18.08.02	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,000005002,4/20/22,,,,,, Change type to 4, 20, 22 The response from the base station is not checked			
Request msg 4	Check the VDO output on PI	See msg 3 interrogation	Ok
	Record and check the AIABK acknowledgement	See msg 3 interrogation	Ok
Request msg 20	Check the VDO output on PI	See msg 3 interrogation	ok
	Record and check the AIABK acknowledgement	See msg 3 interrogation	ok
Request msg 22	Check the VDO output on PI	See msg 3 interrogation	ok
	Record and check the AIABK acknowledgement	See msg 3 interrogation See msg 3 interrogation	ok

18.08.02	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,000005002,3,,5,,000007001,5,, A response is automatically transmitted by one of the addressed transponder			
VDO output of EUT	Check the VDO output on PI		ok
AIABK acknowledgement	Record and check the AIABK acknowledgement	See msg 3 interrogation	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

Date	Result	Status
18.07.02	The field “Message Sequence Number” in the ABK output should by empty (null field), not the number 0.	
	Retest 22.8.02 changed	ok
18.07.02	The message ID 1.2 and destination 2 are not empty if they are null (empty) fields in the ACA sentence	
22.8.02	Retest 22.8.02 changed	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.

18.08.02	**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 = 27	ok
Response channel	Check that the response is transmitted on the request channel		ok

18.08.02	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	Offset = 101, if response on other channel, Offset = 100, if response on same channel 12.09.02 Retest: ok	ok
Response channel	Check that the response is transmitted on the request channel	Request on ch A, response (msg 3) on ch B, depending on the channel of the last msg 1 pos. report. The complete slot allocation of msg 1 changes the channel. This cannot be accepted because all other transponders rely on the slot allocation of each channel 12.09.02 Retest: ok	ok

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

Date	Result	Status
18.08.02 12.09.02	Transmission of interrogated msg 3 reverts the channel allocation of msg 1 position reports. Retest: ok	 ok

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”

18.07.02	**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,1,1,2,000005002,1,6,06P0test,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		----
RX of msg 7 (VDM)	Check that the ackn. msg 7 is received by EUT (VDM)	Not received No success trying to receive any msg 7, May be problem of test environment Retest 30.08.02 Message 7 is received but not displayed as VDM Retest 05.10.2002	Ok

AIABK acknowledgement		Normally ok $AIABK,000008001,A,6,2,2 if not transmitted If transmitted but no ackn. received the ABK is wrong: $AIABK,067125735,A,29,0,1 MMSI is not ok, msg type 29 is not ok Retest 30.08.02 Message 7 If transmitted but no ackn. received the ABK is still wrong: In $--ABK is the source address transmitted and not the destination address. Message type is Ok. Retest 05.10.2002 $--ABK for NAK is Ok $--ABK for Ack shows msg type 7 instead of msg type 6 Retest 30.10.2002	Ok
Add invalid character to encapsulated data, e.g. x,y,z			
Transmission	Check that message is not transmitted	Message is transmitted, invalid data set to binary 0	Acc
ABK sentence	Check that ABK message with ackn. type 2 (could not be broadcast) is output on PI	See ABK of sentences with valid data Retest 30.10.02	Ok
acknowledgement	Check AIABK or MKD for corresponding pos. and neg. ack.		-----

18.07.02	**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,1,1,2,000001005,1,12,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)	Not received No success trying to receive any msg 13 Retest 6.10.2002	ok
acknowledgement	Check AIABK or MKD for corresponding pos. and neg. ack.	Normally ok $AIABK,000008001,A,6,2,2 if not transmitted If transmitted but no ackn. received the ABK is wrong: $AIABK,067125735,A,29,0,1 MMSI is not ok, msg type 29 is not ok Retest 30.08.02 Message 7 If transmitted but no ackn. received the ABK is still wrong: In $--ABK is the source address transmitted and not the destination address. Message type is Ok. Retest 05.10.2002 $--ABK for NAK is Ok $--ABK for Ack shows msg type 13 instead of msg type 12 Retest 30.10.02	Ok

Date	Result	Status
18.08.02	ABK output if no ackn. received, with invalid MMSI and msg type	
06.10.2002	ABK output of ackn received, with invalid msg type	
30.10.02	Retest	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 18.1.2 Acknowledgement.

18.07.02	**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

18.07.02	**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

Date	**Result**	**Status**

18.07.02	Test ok	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

	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	 Retest 30.08.2002 VDO output on Pi shows msg. 19 instead of msg. 8 Retest 06.10.2002	Ok Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,00000000,A,8,6,3 The MMSI has to be a null (empty) field Retest 30.08.02 $AIABK,,B,8,0,3	 Ok

Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence	Retest 30.08.02 message sequence number in ABK is 0 Sequential message identifier of BBM is 6 Retest 6.10.2002	Ok
Message on VDL	Check the broadcast message on VDL analyser	Msg 19 is received as send by EUT	Ok
Rx on other transponder (VDM)	Check the VDM output of an other transponder		----

	Test details - Safety related broadcast message 14		
Test item	**Check**	**Remark**	**Result**
Transmit a safety related broadcast messages 14 with 121 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 121 data bytes or 162 characters			
VDO output of EUT	Check the VDO output on PI	Retest 30.08.02 No VDO output found Retest 6.10.2002	Ok Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,00000000,A,8,6,3 The MMSI has to be a null (empty) field Retest 30.08.02 $AIABK,,A,14,1,2 Message is detected as "could not be broadcast" Retest 6.10.2002	 Ok
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence	Retest 30.08.02 message sequence number in ABK is 1 Sequential message identifier of BBM is 6 Retest 6.10.2002	 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		----

Date	Result	Status
18.07.02	Test ok except MMSI field in ABK sentence	
30.08.02	Retest	
6.10.2002	Retest	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.

	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_111.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	VDO output Retest 30.08.02	 Ok
Message on VDL	Check that no message is received by VDL analyser	Message is received Retest 30.08.02	 Ok
AIABK acknowledgement	Record the AIABK output, check that type = 2 (could not be broadcast)	ABK type = 3 (broadcast) Correct according to the transmission Retest 30.08.02 ABK type = 2	Ok Ok

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

	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	No output	Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements, type should be 3	$AIABK,,B,8,6,2	Ok
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		--

Date	**Result**	**Status**
18.07.02	Longer message is transmitted Messages of e.g. 170 characters are transmitted	ok
30.08.02	Retest	Ok

2.3 14.3 Information content

(6.5.1 M.1371 A2/3.3.8)

Method of measurement

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

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

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

Required results

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

2.3.1 Information content of msg 1

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

02/09/2002	**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	Requires a password input Changed in main unit but not in KDU 18.11.02 retest ok	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	Not required	--
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	Msg17 not yet tested	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

18.11.02	**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	Input of status 15 not possible by KDU	ok
Other status values	Check some other values		Ok

2.3.2 Information content of msg 5

18.11.02	**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		Ok
Reference point for internal GPS			
Reference point A	Check value in msg 5		Ok
Reference point B	Check value in msg 5		Ok
Reference point C	Check value in msg 5		Ok
Reference point D	Check value in msg 5		Ok
Reference point for EPFS			
Reference point A	Check value in msg 5		Ok
Reference point B	Check value in msg 5		Ok
Reference point C	Check value in msg 5		Ok
Reference point D	Check value in msg 5		Ok
Tx of msg 5	Check if msg 5 is transmitted at change of position source		Ok
Voyage related data			
ETA	Check value in msg 5		Ok
Maximum present static draught	Check value in msg 5		Ok
Destination	Check value in msg 5		Ok
DTE flag can be checked in connection with 2.9.2.5 “14.9.2.5 Remote MKD disconnection, when so configured”. Check the flag during that test and enter result her			
DTE on	Check that DTE flag = 0		Ok
DTE off	Check that DTE flag = 1	DTE=1 if connection lost DTE=0 if KDU in stby mode 06.12.02 Retest: DTE = 1 if conection lost DTE = 0 if DTE is set ot “Present” with SSD and connection to KDU ok	ok
Type of EPFS			
Apply simulated GLL,VTG, GDT and ROT sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst. Change talker according to test item			
Talker = GP	Check type of EPFS = 1		Ok

Talker = GL	Check type of EPFS = 2		Ok
Talker = GN	Check type of EPFS = 3		Ok
Talker = LC	Check type of EPFS = 4		Ok
Talker = IN	Check type of EPFS = 6		Ok
Talker = other	Check type of EPFS = 0		Ok

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.

04.09.02	**Test details – Change of reporting rate**		
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		
	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		
	Check that new rate is established within 1 minute		Ok
	Check that new reporting rate is 2 s		Ok
Speed = 25 kn Increase heading by 6 degr. steps sometimes	Check that no change		Ok
Speed = 25 kn Stop Increasing heading	Check that no change		Ok
Reduction of speed to Speed = 15 kn	Check slot allocation by deallocation of slots, Msg 3 not required for new reporting rate		ok
	Check that new rate starts after 3 min and is established within 4 minutes	Starts at once, no delay of 3 min Retest 6.10.2002	Ok
	Check that new reporting rate is 6 s		Ok
Speed = 15 kn Increase heading by 6 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate	It seems that the reporting rate is increased by a complete new rescheduling 29.10.02 Retest: The reporting rate is increased by by inserting ITDMA slots	ok
	Check that new rate is established immediately		Ok

	Check that new reporting rate is 2 s		Ok
Speed = 15 kn Stop increasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)	09.10.02 Retest: no change of reporting rate 29.10.02 Retest: The insertion is stopped about 55 s after end of heading change	ok
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change	Longer than 50 sec. Ca. 2 min. Retest 29.10.2002: The insertion is stopped about 55 s after end of heading change	Ok
	Check that new reporting rate is 6 s again		Ok
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	Starts at once Retest 6.10.2002	Ok
	Check that new reporting rate is 10 s		Ok
Speed = 10 kn Decrease heading by 6 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate	It seems that the reporting rate is increased by a complete new rescheduling 29.10.02 Retest: The reporting rate is increased by by inserting ITDMA slots	ok
	Check that new rate is established immediately		Ok
	Check that new reporting rate is 3 1/3 s		Ok
Speed = 10 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	Longer than 50 sec. Ca. 2 min. Retest 29.10.02: The insertion is stopped about 55 s after end of heading change	Ok
	Check that new reporting rate is 10 s again		Ok

Timeout handling after increasing reporting rate	The timeout handling after establishing the new reporting rate is incorrect: It should be in the range of 3 ... 7, same for all slots of the following frame, then counting down per frame. There are 2..3 slot with timeout 1, then 2 slots with timeout 1 and then 1 frame with timeout 0. 09.10.02 Retest: no change Retest 29.10.02: The timeout handling ís now ok. Random time-outs in the range of 2..6 are used in the next frame	ok
Line 43 of table	There is a message not allocating anything. If this slot is no longer required msg 1 with timeout 0 and slot offset 0 should be used. 09.10.02 Retest: not found in the new recording	
Line 47	There is a msg3 in a not allocated slot. In this phase only allocated slots should be used, allocated by changing a msg 1 to msg 3 and allocating the new slot. 09.10.02 Retest: not found in the new recording	ok
Line 210	There is a msg 3 in an unallocated slot allocating a slot which is never used. 09.10.02 Retest: not found in the new recording	ok
Notes of the Excel table of 9.10.02 RepRate_speed_2.xls		
Line 10/11 + 39/40	Unallocated slots are used for start of rescheduling. It is absolutely no problem to use at minimum for the first msg 3 an allocated slot. The EUT should wait until the next regular position report (or to the next on channel A), change this to msg 3 and start rescheduling. Retest 29.10.02: Allocated slots are used for msg 3	ok
Line 21, 25	In line 21 a slot is announced which is never used. The slot of line 25 is not allocated. It may be that there is a error in transmission or reception of slot increment A similar wrong allocation happens in line 284. A slot 1587 is allocated but never used. Maybe is should allocate slot 261 in line 288 which is not allocated. Retest 29.10.02: Not found ín new test	ok
Line 33	There is a slot jump of +1 slot compared to the previous frame Retest 29.10.02: A jump of +2 on channel A and +3 on channel B occurred at the same time (see line 335) Retest 25.11.02: Not found ín new test	ok

Line 260 Line 288	This slot should not be release but used to keep this slot or allocate a new slot in this selection interval in the next frame. As a consequence the slot in this SI in the next frame (line 288) is not allocated. Maybe it it should be allocated by the msg 3 in line 284 Retest 29.10.02: The same happens in the new retest: see line 213+237 Retest 25.11.02: A similar problem happens in the new retest: see line 249 ,272 and 275: In Line 249 the slot 243 is released. Thereby the slot 261 in the next frame (in the same SI) in line 275 is not allocated. Message 3 in line 272 perhaps should allocate this slot 261 but it allocated the slot 1577 which is never used Retest 06.12.02: The same situation is now handled correctly. The slot at beginning of rescheduling is released but is allocated correctly at end of rescheduling.	ok
Line 226-289	Some timeouts are not decremented as required but keep the value of the previous frame. Retest 29.10.02: The same happens in the new retest: see line 216, 222,225,228,231 see note) Retest 25.11.02: This is ok now, alle slots in the same situation are decremented correctly	ok
Notes of the Excel table of 29.10.02 RepRate_speed_3.xls		
Line 24	This line allocates a slot which is never used. If no slot has to be allocated in a msg 3 the slot allocation value should set to 0 as i is correctly done in line 25. Why is line 24 handled different to line 25 in the same situation? Retest 25.11.02: This is handled correctly now.	ok
Line 189, 260	This is the first frame after a the slot time-out 0. In this case the "new NTS should be assigned a time-out value with a randomly selected value between TMO_MIN (3) and TMO_MAX (7)" (1371 sec3.3.5.4.3). In these lines the time-out value is 2 Retest 25.11.02: Only 3...7 found	ok

Note: see "Notes on test report results", 3:
The reason, why in 1371 sec3.3.5.5.1 and 2 the time-out should not be decremented from 1 to 0 is the following:
If the time-out of a position report is 0 the new slot of this selection interval in the next frame has to be allocated by this message. That can not be done if this message is converted to msg 3. Therefor the time-out has to be kept on 1 while it is converted to msg 3 and decremented to 0 in the next frame, when it is not converted to msg 3. This situation is addressed in 1371 sec3.3.5.5.1 and 2.
If this slot is kept but not used for msg 3 there is no reason not to decrement the time-out to 0. It can be decremented to 0 and the slot of the next frame can be allocated.

04.09.02	**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	Checked after 2 min	ok
	Check that new reporting rate is 10 s		ok

Note: 61993 differs to 1371 4.3.1 with regard to behaviour when speed sensor unavailable (maintain old rate) which is also accepted

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)

04.09.02	**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	Msg 3 coming every 10 sec. Retest 6.10.2002 Msg 3 every 3 min	ok
Nav. status = 1 Speed = 4 kn	Check that reporting rate is 10 s	Longer than 50 sec. Ca. 2 min. Retest 6.10.2002	Ok
Nav. status = 5 (moored) Speed = 2 kn	Check that reporting rate is 3 min	Retest 6.10.2002 Msg 3 every 3 min	Ok
Nav. status = 2 or other Speed = 2 kn	Check that reporting rate is 10 s		Ok

Date	**Result**	**Status**
6.10.2002	3 min cycle is used by sending msg 3	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.
A basic test of assigned mode is made in 2.1.2 14.1.2 Assigned 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.

25.11.02	**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 = 3 (increment = 225 = 6 s)			
NavStatus = 0 (under way using engine) Speed = 10 kn	Check that slot offset = 225 and reporting rate is 6 s And msg type = 2		Ok
NavStatus = 1 (at anchor)	Check that Navstatus has no effect: slot offset = 225 and reporting rate is 6 s And msg type = 2		Ok
Nav Status = 0 Increase speed to 15 kn	Check that reporting rate is not changed.		Ok
NavStatus = 0 Speed = 25 kn	Check that reporting rate = 2 s and Msg type = 1 (change with msg 3)	Reporting rate is increased to 2 s.	Ok
NavStatus = 0 Speed = 15 kn Course change	Check that reporting rate = 2 s and Msg type = 1/3 (msg 3 inserted between msg 1)	No increase of reporting rate by change of heading. 05.12.02 Retest: Assigned mode is finished immediately at beginning of heading change. After 1 frame it starts inserting msg 3 to increase the reporting rate. It is recommendet to deallocate the assigned slots with timeout 0 and then start a new rescheduling so that there no gap of 1 minute in transmission	Rec
Transmit Message 16 at 15 kn speed	Check that EUT changes to assigned mode		Ok
Note:	At end of assigned mode at 15 kn speed the autonomous reporting rate is 10 s, not 6 s as required for 15 kn speed. After end of the rescheduling frame the reporting rate is increased to the requrired 6s be a new rescheduling frame. The EUT should reschedule directly to the required reporting rate 05.12.02 Retest: ok, EUT reschedules directly the correct reporting rate according to the actual speed.		ok

26.11.02	**Test details b) – Designated reporting rate**		
Test item	**Check**	**Remark**	**Result**
Send an assignment message 16 with offset = reporting rate of 100 msg/10 min, increment=0			
NavStatus = 0 (under way using engine) Speed = 10 kn	Check that reporting rate is 6 s And msg type = 2		Ok
NavStatus = 1 (at anchor)	Check that navStatus has no effect: reporting rate = 6 s msg type = 2		Ok
Nav Status = 0 Increase speed to 15 kn	Check that reporting rate is not changed.	See 4.6.4	ok
NavStatus = 0 Speed = 25 kn	Check that reporting rate = 2 s and Msg type = 1 (change with msg 3)	See 4.6.4	ok
NavStatus = 0 Speed = 15 kn Course change	Check that reporting rate = 2 s and Msg type = 1/3 (msg 3 inserted between msg 1)	See 4.6.4	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.

6.10.02	Test details - Static data reporting rates		
Test item	**Check**	**Remark**	**Result**
Record msg 5 and check repetition rate			
a) Default update rate	Check that update rate is 6 min		Ok
b) Change static data using SSD sentence short time after regular msg 5	Check that msg 5 is transmitted within 1 min	No msg 5 Retest 01.11.02	ok Ok
Restart reporting rate of 6 min	Check that the next msg 5 is transmitted after 6 min		Ok
Change voyage related data using VSD sentence	Check that msg 5 is transmitted within 1 min	System retrigger the 6 min cycle. Change data restart the 6 min timer the cycle is up to 12 min if any data is change after 6 min Retest 01.11.02	ok Ok
Change static data using MKD	Check that msg 5 is transmitted within 1 min	No msg 5 Retest 6.10.02	 Ok
Change position source with different ref. point data (see 61993 6.10.3.4)	Check that msg 5 is transmitted within 1 min because of change of ref. point data		Ok

Date	Result	Status
6.10.02	Changing of data restart the 6 min cycle	
1.11.02	Retest	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.

18.11.02	**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	Accessable by external PC with terminal software	Ok
Read out recorded data	Check that all switch off times are correctly recorded	Description in manual needed how to initiate data transfer; needs retest 09.01.03 Retest: Readout of recorded data using the Utility Software: Data are recorded correctly including switch on and off time, off duration, and switch off Display is not ordered by time	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.

	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	1:04 min	OK
b) Switch off EUT for approx. 0.5 s	Check that EUT starts transmission within 2 min	1:04 min	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.

29.11.02	Test details - Channel selection		
Test item	**Check**	**Remark**	**Result**
Select channels and bandwidth according to the test items in a regional area around the actual position so that is in use. The VDL analyser has to be switched to the selected channels			
a) Enter manually: 2 simplex channels 25 kHz spacing 25 kHz bandwidth	Check that channels are used		Ok
	Check bandwidth		Ok
	Check TXT output at PI	No TXT output 06.12.02_Retest: ok, output of txt message 36	ok
	Check ACA output at PI		Ok
b) Enter by using msg 22: 1 duplex channel 25 kHz spacing 25 kHz bandwidth	Check that channels are used		Ok
	Check bandwidth		Ok
	Check TXT output at PI	No TXT output 06.12.02_Retest: ok, output of txt message 36	ok
	Check ACA output at PI		ok
c) Enter by ACA sentence: 1 duplex channel 25 kHz spacing 12.5 kHz bandwidth	Check that channels are used		Ok
	Check bandwidth		Ok
	Check TXT output at PI	No TXT output 06.12.02_Retest: ok, output of txt message 36	ok
	Check ACA output at PI		ok
d) Enter by DSC 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	No TXT output 06.12.02_Retest: ok, output of txt message 36	N ok
	Check ACA output at PI		ok
Note to a)	Manual channel switching of the default channels for high see area is password protected		ok
Note to b)	Addressed msg 22 is accepted only if the trailing 5x0 are not added 06.12.02_Retest: ok, Address is evaluated correctly		ok
Note to c)	ACA sentence is accepted only if it contains a full area setting including the geographic coordinates of the corners. This can be accepted if it is clearly indicated in the Manual that ACA sentences without area are not accepted and evaluated.		Rec

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.

13.09.02	**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	Transmitter is teperature protected	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)

	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	Empty alarm Not implemented Retest 13.09.02 Empty alarm is displayed; this should be suppressed Recommendation	Ok

2.9.1.1 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".

6.9.02	**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.

19.12.02	**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	At disconnection of antenna an alarm sentence with ID 002 (VSWR limit exceeded) is output and transmission continues. This behaviour is checked in test 14.9.2.2.	ok
ALR output	Check that ALR sentence ID 001 is output at PI	See test 14.9.2.2	

ALR output repetition	Check that the ALR sentence is repeated with a rate of 30 s	See test 14.9.2.2	
Alarm relay	Check that alarm relay is activated	See test 14.9.2.2	
MKD display	Check that the alarm is displayed on the MKD	See test 14.9.2.2	
Send an ACK sentence	Check that alarm relay deactivated	See test 14.9.2.2	
	Check that ALR sentence is updated	See test 14.9.2.2	
	Check that alarm display on the MKD is updated	See test 14.9.2.2	
Reconnect VHF antenna	Check that ALR sentence is updated	See test 14.9.2.2	
	Check that alarm display on the MKD is updated	See test 14.9.2.2	
Documentation about TX malfunction detection	Check that documentation describes how the AIS detects Tx malfunction	Description is provided in an extra document In addition it describes TXT messages with ID 76...86 with more detailled information about the failure	ok

2.9.2.2 14.9.2.2 Antenna VSWR

Method of measurement

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

Required result

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

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

	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		Ok
Generate a new alarm by connection the VHF antenna and again connect the mismatched dummy load			
Acknowledge the alarm on MKD (applies to all alarms) note: NEW	Check that alarm relay deactivated		Ok
	Check that ALR sentence is updated		Ok
	Check that alarm display on the MKD is updated (the alarm indication is cleared)		Ok
Connect VHF antenna	Check that ALR sentence is updated		Ok

2.9.2.3 14.9.2.3 Rx malfunction

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

19.12.02	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.	In addition it describes TXT messages with ID 60k...67 with more detailled information about the failure	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 a TXT-sentence with ID 007 is sent and the relay output is not activated.

13.9.02	**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		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	For alarms yes No display of txt sentences Retest 6.10.02	 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.

Retest 13.09.02	**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	System stop sending msg 5 Retest 13.09.02	Ok Ok
ALR output	Check that ALR sentence ID 008 is output at PI		Ok
Alarm relay	Check that alarm relay is activated		Ok
MKD display	Check that loss of connection to the transponder is displayed on the MKD	Only by a led A message window is required Retest 13.09.02	Ok 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.

	Test details - Position priority – changing downwards		
Test item	**Check**	**Remark**	**Result**
Connect sensor inputs and correction data according to the test items			
a) • External DGNSS • Internal DGNSS if available, else internal GNSS	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that RAIM flag is set according to sensor input data		Ok
b) Change from a: • External sensor mode from DGNSS to GNSS • Internal DGNSS by msg 17	Check that internal position is used		
	Check that position accuracy flag = 1		
	Check that RAIM flag is set according to documentation of internal GPS		
	Check that msg 5 is output with new ref. point		
	Check that TXT sentence with ID 024 is output on PI		
	Check that status display of MKD is updated according to TXT sentence		
c) Change from b: • Internal DGNSS by beacon • External sensor mode is GNSS	Check that internal position is used		
	Check that position accuracy flag = 1		
	Check that TXT sentence with ID 023 is output on PI		
	Check that status display of MKD is updated according to TXT sentence		

b) Change from c: • Remove correction data for Internal GNSS • External GNSS input	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to documentation of internal GPS		Ok
	Check that msg 5 is output with new ref. point		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	Shows always “external” 18.11.02 retest ok	ok
d) Change from a: • Change external sensor mode to GNSS • Internal GNSS available	Check that external position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to documentation of internal GPS		Ok
	Check that msg 5 is output with new ref. point	Not required	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
e) Change from d: • Remove external GNSS input • Internal GNSS available	Check that internal position is used	If external GNSS is not available because of DTM other than W84 old external position is freezed instead switching to internal. If internal in use, MKD still indicates external. Retest 6.10.02 MKD indicates internal but the Position is still freezed on MKD and VDO Msg1 output Retest 1.11.02	Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to documentation of internal GPS		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 is output on PI		Ok

	Check that an alarm according to ALR message is displayed on MKD	Only displayed by counting the alarm counter on main screen Retest 6.10.02	Ok
	Check that status display of MKD is updated according to TXT sentence	Always ext EPFS Retest 6.10.02	Ok
f) Change from e: • Disable internal GNSS • No external GNSS input	Check that default position is used		Ok
	Check that position accuracy flag = 0		Ok
	Check that RAIM flag is set according to documentation of internal GPS		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	Only displayed by counting the alarm counter on main screen Retest 13.9.02 popup window implemented	ok
Status change time	Check that status is changed after 5 s	Changed ofter 7 s Retest 6.10.02	Ok

	Test details - Position priority – changing upwards		
Test item	**Check**	**Remark**	**Result**
Connect sensor inputs and correction data according to the test items			
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: • Activate internal GNSS • No external GNSS input	Check that internal position is used		Ok
	Check that position accuracy flag = 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 is output on PI		Ok
	Check that the alarm on MKD according to ALR ID 026 is updated		Ok
	Check that status display of MKD is updated according to TXT ID 025	Always ext EPFS Retest 6.10.02	Ok

d) Change from e: • Apply external GNSS input • Internal GNSS is available	Check that external position is used		Ok
	Check that position accuracy flag = 0		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 is output on PI		Ok
	Check that the alarm on MKD according to ALR ID 025 is updated		Ok
	Check that status display of MKD is updated according to TXT ID 022	Shows always extr epfs	Ok
c) Change from d: • Apply correction data for DGNSS by beacon • External mode is GNSS	Check that internal position is used		
	Check that position accuracy flag = 1		
	Check that msg 5 is output with new (internal) ref. point		
	Check that TXT sentence with ID 023 is output on PI		
	Check that status display of MKD is updated according to TXT ID 023		
b) Change from c: • Apply correction data for DGNSS by msg 17 • External mode is GNSS	Check that internal position is used		
	Check that position accuracy flag = 1		
	Check that TXT sentence with ID 024 is output on PI		
	Check that status display of MKD is updated according to TXT ID 024		
a) Change from b: • Change external mode to DGNSS • Internal DGNSS	Check that external position is used		
	Check that position accuracy flag = 1		
	Check that TXT sentence with ID 021 is output on PI		
	Check that status display of MKD is updated according to TXT ID 021		
b) Change from d: • Change external mode to DGNSS • Internal GNSS	Check that external position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that msg 5 is output with new (external) ref. point		Ok
	Check that TXT sentence with ID 021 is output on PI		Ok
	Check that status display of MKD is updated according to TXT ID 021		Ok
Status change time	Check that status is changed after 30 s		

Date	Result	Status
24.8.02	If external GNSS is not available because of DTM other than W84 old external position is freezed instead switching to	

	internal. 01.11.02 Retest	Ok
24.8.02	If internal in use, MKD still indicates external. 01.11.02 Retest	Ok

2.9.3.2 14.9.4 Heading sensor

(6.10.3.1)

Method of measurement7

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.

	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	Only displayed by counting the alarm counter on main screen Retest 6.10.02	Ok
	Check that an alarm according to ID 035 is displayed on MKD	Only displayed by counting the alarm counter on main screen Retest 6.10.02	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		OK
	Check that the alarm display on MKD is updated		Ok
	Check that the status display on MKD is updated (heading and ROT valid)	Is not exccessible on display Retest 1.11.02	Ok
c) Change ROT talker • Valid heading • ROT, talker not TI	Check that ROT in VDL is + 720 / 127 for ROT > 10 °/min, turning right	Changing the talker to Tx is not detected by the system and the ROT is used as with talker TI only change to talkers without a leading 'T' are detected as non ROT sensor Retest 01.11.02	Ok
	Check that ROT in VDL is - 720 for ROT < -10 °/min, turning left		Ok
	Check that TXT message with ID 034 (other ROT in use) is output on PI	TXT msg 33 is shown Retest 6.10.02	Ok
	Check that the status display on MKD is updated (other ROT)	Is not exccessible on display Retest 01.11.02	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		Ok
	Check that the status display on MKD is updated (ROT in use)	Is not exccessible on display Retest 01.11.02	 Ok
c) Disconnect ROT • Valid heading • No ROT Change heading > 5 °/30s	Check that ROT in VDL is + 127 for increasing heading	Heading is used for calculation	Ok
	Check that ROT in VDL is - 127 for decreasing heading		Ok
	Check that TXT message with ID 034 (other ROT in use) is output on PI	TXT msg 33 is shown Retest 6.10.02	 Ok
d) 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

Date	Result	Status
6.10.02	Problems with decoding of talkers	
01.11.02	Retest	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.

	Test details - Speed sensor		
Test item	**Check**	**Remark**	**Result**
Connect external speed sensor input according to test items. Internal GPS is available			
a) Connect external position and speed • External Position • External speed	Check that external SOG is used in VDL message 1,2,3		Ok
	Check that external COG is used in VDL message 1,2,3		Ok
	Check that TXT message with ID 027 (external speed in use) is output on PI	Tx on change only	
	Check that alarm relay is inactive		Ok
	Check that the status according to TXT msg ID 027 is displayed on MKD		Ok
b) Disconnect external position • No external Position • External speed	Check that SOG from internal GPS is used in VDL message 1,2,3	SOG is used from external Retest 6.10.02	Ok
	Check that COG from internal GPS is used in VDL message 1,2,3	COG is used from external Retest 6.10.02	Ok
	Check that TXT message with ID 028 (internal speed in use) is output on PI	Retest 6.10.02	Ok
	Check that the status according to TXT msg ID 028 is displayed on MKD	Retest 6.10.02	Ok
b) From a: Disconnect external position and speed • No external Position • No external speed	Check that SOG from internal GPS is used in VDL message 1,2,3		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	No txt msg found Retest 6.10.02	Ok
	Check that the status according to TXT msg ID 028 is displayed on MKD	See above Retest 6.10.02	Ok

2.10 14.10 Display and control

(6.11)

2.10.1 14.10.1 Data input/output facilities

Method of measurement

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

a) Check size of minimum display

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

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

Required results

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

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

c) Confirm that all necessary data can be input.

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

	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		Ok

	Test details b) - MKD display of received messages		
Test item	**Check**	**Remark**	**Result**
Receive messages and check display of data			
MSG 1,2,3- required - Display of dynamic ship data	Check that received target is displayed		ok
	MMSI	recommended	-
	Position (RNG, BRG); Check values	Required Rel BRG is shown and not correct when HDT not available Recommendation: Display true BRG Retest 6.10.02	Ok
	Position (Lat,Lon)	Recommended	-

	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	-
	IMO number	Not required	-
	Call sign		Ok
	Name of ship	Underscore is displayed as arrow Retest 6.10.02	Ok
	Type of ship and cargo	Recommended	-
	Dimension/Reference for position	Length recommended	-
	Type of EPFD	Not required	-
	Estimated time of arrival	Not required	-
	Maximum present static draught	Not required	-
	Destination	Not required	-
	DTE flag	Not required	-
MSG 4 Base station report - Recommended -	MMSI	recommended	-
	Position (Lat,Lon)	recommended	-
	Position (RNG, BRG); Check values	recommended	-
	Time	Not required	-
	PA flag	Not required	-
	RAIM flag	Not required	-
MSG 9 SAR aircraft position report - optional -	MMSI	Recommended	-
	Position (RNG, BRG); Check values	Recommended	-
	Position (Lat,Lon)	Recommended	-
	Time	Not required	-
	PA flag	Not required	-
	SOG and COG	Recommended	-
	RAIM flag	Not required	-
	DTE flag	Not required	-
MSG 12/14 Safety related text message - Required -	MMSI	Call sign is displayed Recommendation: add MMSI in msg view window	Ok
	Text content	Required	Ok
	Broadcast or selective	Recommended	Ok
	Indication of rx msg	No indication, msg view window should popup Retest 6.10.02	Ok
MSG 18,19 Class B position report	MMSI	required	-
	Position (RNG, BRG); Check values	required	-

	Position (Lat,Lon)	recommended	-
	Time	Not required	-
	PA flag	Not required	-
	SOG and COG	Recommended	-
	True heading	Recommended	-
	RAIM flag	Not required	-
	Name	Recommended Could not yet be tested, because VDL generator doesn't generate msg 19 correctly	-
	Type of ship and cargo	Recommended	-
	Dimension/Reference for position	Length recommended	-
	Type of EPFD	Not required	-
	DTE flag	Not required	-
MSG 21 Aids to navigation report - recommended -	MMSI	Recommended	-
	Type of Aids to navigation	Recommended	-
	Name of Aids to navigation	Recommended	-
	Position (RNG, BRG); Check values	Recommended	-
	Position (Lat,Lon)	Recommended	-
	PA flag	Not required	-
	RAIM flag	Not required	-
	Type of ship and cargo	Not required	-
	Dimension/Reference for position	Recommended	-
	Type of EPFD	Length recommended	-
	Off position indicator	Not required	-
	SOG, COG are not displayed or show default values	Recommended	-
Means to select messages	Check that means to select received messages are available	Scroll knob	Ok
Means to select data fields	Check that means to select data fields are available	2 windows for data display	Ok

	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
Type of ship and cargo	Check that data can be input		ok
	Check if input by number or by selection of items	Input by number; recommendation : table should be included in the manual	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
Nav Status	Check that Nav Status can be input	Change by selection	ok

Date	Result Data input/output facilities	Status
7.9. 06.12.02	MKD does not reflect transmitted static data if SSD is input through PI Retest: ok	 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.

10.9.02	**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 required	-

	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	Not required, can be selected see below	-
	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)	Recommendation: Indication in case of failed addressed msg should better be “no reply received” instead “could not be broadcast”	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
TX msg 6, 8	Binary text msg using FI 0		

Date	Result	Status
10.9.	Safety msg	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.

07.11.02	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		Ok
	Check display of in use	Not displayed. We recommend also to display if an area is in use. 26.11.02 Retest: "In Use" is displayed	ok
Entry of a new area	Check selection between changing an existing area and creating a new regional area entry	Could not detect it because a changed area was refused after confirmation with "yes" 08.11.02 Retest: New areas are entered by changing area 1. If the changed area does not overlap the area 1 a new area is generated.	ok
	Check input of Channel A and B	See note 1:	Acc.
	Check input of RX/TX mode		Ok
	Check input transmission power		Ok
	Check input of NE point of area	It is very inconvenient that the N/S and E/W value changes at start of entering lat or lon value to "S" and "W". It should keep the state as before editing 26.11.02 Retest: N/S and E/W are not changed at start of editing	ok
	Check input of SW point of area	See NE point	
	Check input of transitional zone		ok
	Check that the user has to confirm a second time that the new data shall be stored	Confirmation is required. Edited data are not acceptet. After confirmation with "yes" the old data are displayed and used again. The new data are not accepted, without any error message. 08.11.02 Retest: Data are accepted now	Ok ok
Enter invalid channel	Check that entry is refused	Channel is always refused 08.11.02 Retest: Channel > 3300 are refused, Channel 432 was accepted	

		No Error indication! An error message should be displayed. 26.11.02 Retest: Only valid channels can be selected	ok
Enter too small area (<20 nm)	Check that entry is refused	Area is always refused 08.11.02 Retest: Area is refused, No Error indication! An error message should be displayed. 26.11.02 Retest: Display of "new region not accepted"	ok
Enter too large area (> 200 nm)	Check that entry is refused	Area is always refused 08.11.02 Retest: Area is refused, No Error indication! An error message should be displayed. 26.11.02 Retest: Display of "new region not accepted"	ok
Enter a region according to M.1371-1 A2/4.1 figure 4.1.5A (4 adjacent areas)	Check that entry is refused	Cannot be checked because area is always refused. 08.11.02 Retest: ok, area is refused, No Error indication! An error message should be displayed. 26.11.02 Retest: Display of "new region not accepted	ok
Changing an existing area	Check that existing area for changes can be selected	Cannot be selected. After pressing "change" always the area 1 is displayed for changes. So only the area 1 can be changed Note 2) 26.11.02 Retest: The selected area can be edited	ok
	Check change of Channel A and B		Ok
	Check change of RX/TX mode		Ok
	Check change transmission power		Ok
	Check change of NE point of area		Ok
	Check change of SW point of area		Ok
	Check change of transitional zone		Ok
	Check that the user has to confirm a second time that the new data shall be stored		ok
Changing of default values	Check change of Channel A and B	No change of default values	ok
	Check change of RX/TX mode	No change of default values	ok

	Check change transmission power	No change of default values	ok

Note 1)
The channel can be changed by the rotating knob after pressing key “1” or “2”. It is not possible to know this without manual! Therefore an operetor can not change it without reading the manual.
It is recommended to change it, e.g. by using the rotating knob to select not the complete channel line but the different items and use a soft key to switch the rotating knob between channel change and input field selection or enter the channel directly with the numeric key. Changing e.g. the channel from 0 (empty field) to 2088 takes a lot of time.
If it would only be possible to select the channels defined in ITU-R M.1084-3 Appendix 4 using the knob would be much better.

Error: if the “back” key is used to leave the editing of area definition the rotation knob remains in the channel select mode. If the area definition change function is called again it is not possible to select the input fields because the rotation knob only changes the channel.
08.11.02 Retest: ok

Note 2)
It is not explicitely required in the performance standard that it should be possible to change the stored regional settings, but It is not very convenient to do it by entering a complete new area which then replaces the wrong one. Therefore we recommend to make it possible to change not only the area 1.

Date	Result	Status
07.11.02 08.11.02	I did not succeed entering or changing any region parameters. This is either a programming error or a very inconvenient user interface. Retest: ok, areas can be entered and changed	 ok

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

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

Date	**Result**	**Status**
7.9. 08.11.02	Windows for alarms and for text messages shall popup if alarm condition occurs Retest: The compled display is covered by a window indicating that an alarm has occured. We recommend to display in this window also the text of the alarm(s) which activated this window. 26.11.02 Retest:: The text of the last alarm is	

	displayed	ok

2.10.4 Ergonomic aspects

These are some ergonomic aspects from user view (Recommendations).

Topic	Description
Nav status	Nav status is the voyage related item most likely to be changed often, but is last in the list of items under “input data / SSD,VSD

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

05.09.02	**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
• Disable GPS, • One base station with UTC direct within range	Check that sync state is 1 (UTC indirect)	Sync state is 2 30.10.02 Retest: Sync state is 1	ok
	Check that report rate is 10 s		ok

4.1.2 16.1.2 Synchronisation test without UTC, semaphore

(M.1371 A1/3.1.1.4)

Method of measurement

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

Required results

Transmitted CommState shall fit the Synchronisation mode.

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

05.09.02	**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	Check that sync state is 3		Ok
• Other Transponders all without GPS, • Semaphore 1)	Check that report 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.

Date	**Result**	**Status**
05.09.02	Test ok	ok

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

	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	Reporting rate is 2 s The EUT was semaphore before starting base station report and it seems it does not leave this mode 30.10.02 Retest: Reporting rate is 10 s	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.

05.09.02	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	There is a constant slot offset between slot number used and slot number indicated in Commstate. It is different for each start of the unit 30.10.02 Retest: The offset is now in most cases 1, in one case when starting with GPS it was 0, starting without GPS it was always not 0 after connection of GPS 27.11.02 Retest: Slot numbering is ok now	ok
Slot count	Check that Slot number does not exceed 2249		ok
Slot length	Check that Slot length does not exceed 26,67 ms	Not checked	

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 .

	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 323 to 343	T2 is in the range of 376-388. T2 shoul be about 0.2-0.3 ms earlier 27.11.02 Retest: T2 is now in the range of 345...355. This is accepted taking into account the inaccuracy of the VDL analyser	ok
UTC indirect	Check that T2 is in the range of 302 to 364	EUT seems not to be synchronized to externel AIS, After disconnection of GPS the T2 value is slowly drifting from about 380 (see UTC direct) to 90 within about 30 min. 27.11.02 Retest: T2 is now about 0.05 ms < than the T2 of the transponder it is synchronised to	ok

	Test details - Synchronisation jitter		
Test item	**Check**	**Remark**	**Result**
Operate device at 12.5 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 323 to 343		----
UTC indirect	Check that T2 is in the range of 302 to 364		----

4.4 16.4 Data encoding (bit stuffing)

Method of measurement

Setup standard test environment.

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

Required results

Confirm that

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

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

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

05.11.02	**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.

05.11.02	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.

17.07.02	Test details – Channel access protocol		
Test item	**Check**	**Remark**	**Result**
Switch on EUT and record data with VDL analyser. Note the switch on time in UTC			
Transmission time	Check that first transmission of position report is within 2 min after switch on	First transmission is about 1:10 min after switch on Seem to be a little short to settle GPS and RX and receive 1 complete frame before first transmission	ok
Initial message type	Check that the network entry is done with msg 3		ok

Slot increment	Check that the slot increment is in the range of 750+/-75	Slot allocation by msg 3 should be done on the same channel, a msg 3 on ch A should allocate the next msg 3 on ch A using an slot increment of about 750 (20s) The EUT allocates on ch A the next slot of ch B 12.09.02 Retest: ok now	ok
Slot allocation in first frame	Check that the slots allocated by msg 3 are used by the next msg 3 on the same channel	There is an offset of +/-1 between allocated and used slots: Allocated → used 818 → 817 (-1) 1194 → 1195 (+1) 1568 → 1567 (-1) 1944 → 1945 (+1) Seems to be a offset between the slot counting of the 2 channels 12.09.02 Retest: ok now	ok
Keep flag	Check that the keep flag is set in msg 3	Keep flag of the last msg 3 is not set but slot is kept in the next frames 12.09.02 Retest: ok now	ok
Slot offsets	Check that the slot offsets of msg 3 are in the range 375 +/- 75= 300 ... 450		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)	There is also a timeout of 1 12.09.02 Retest: ok now	ok
	The first msg 3 is output as VDO on PI port, but is not received by the VDL analyser or another transponder. 12.09.02 Retest: no change Tx can be heard on air, but is not recognized by VDL analyser. Repeated 2 times Note: VDL analyser also receives msg with invalid CRC See modulation diagram! 09.10.02 Retest: ok, first message is received		ok
	Note: At start of transmission there is a shift of about 2 slots between the first frame and the following frames 09.10.02 Retest: ok, no shift of slots		ok

Date	Result	Status
17.07.02 12.09.02 09.10.02	Test not ok, see details Retest. Most failures ok now, see details Retest, ok	 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.

17.07.02	**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)	In the checked range only range of +/- 3 slots from NI is used in a SI of 75 slots, requrieres further investigation 12.09.02 Retest: ok now	Ok

CommState sub message	Check that for time-out 3,5,7 the number of received stations is indicated		Ok
	Check that for time-out 2,4,6 the slot number is indicated	There is a constant offset between indicated slot and used slot, in the recorded intervall an offset of 129 slots, after the next start there was an offset of 328 12.09.02 Retest: no change 09.10.02 Retest: Has been changed, there is now an offset of constantly –1: that means: in slot 152 the slot number 151 is indicated in position report. 29.10.02 Retest: If the EUT starts with GPS in 1 case the slot number was ok. In 2 other tests starting with GPS and in 2 test when the EUT started without GPS and GPS was connected), there was still a constant offset of –1 as described above. 25.11.02 Retest: The slot number in position report is correct now.	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		

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.

05.11.02	**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	Will be done together with the 90 % load test 19.12.02	ok

05.11.02	**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: AIABM_BBM_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	20 msg are transmitted, then about 10 are refused, again 20 transmitted ...	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.

05.11.02	**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	Reporting rate is 12msg/min	ok
Offset value = 1000 (> 600 msg/10 min	Check that the reporting rate is 600/10min = 60/min = 1s	Reporting rate is 12msg/min	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	Reporting rate is 12msg/min	ok
Check, that the reporting rate is increased if speed requires a higher reporting rate than that directed by the message 16. Apply a sensor speed input of 10 kn.			
Send a msg 16 with slot increment = 3 (225 = 6 s)	Check that slot offset is 225 slot and reporting rate is 6 s		Ok
Increase speed to 15 kn	Check that reporting rate is not changed		Ok
Increase speed to 25 kn	Check that the reporting rate is changed to 2 s	Reporting rate is increased to 2 s	Ok

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).

	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	Increment is 124/126/124/126 ... On 1 channel it is 250/250/250... 05.09.02 Retest: ok now	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	Timeout is 3 05.09.02 Retest: timeout is 2, minimum value is 3 10.10.02 Retest: timeout is 5, ok	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 deallocates all msg 2 slots with timeout 0		ok
	Check that the EUT changes slots with timeout 0 on each channel to ITDMA slot msg 3 to start autonomous mode		ok
	Check that EUT initialises autonomous mode like network entry	Same failures as at network entry, but all msg 3 are sent on channel B allocating slots for channel A and B 05.09.02 Retest: ok now	ok

Slot increment of msg 16		The slot increment should be a value in the range of 1..6 from the table in Clarifications to ITU-R M.1371, 2.45 to A2;§3.3.8.2.12. EUT takes directly the slot increment value. 05.09.02 Retest: ok now	ok

	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	Allocation by msg 3 is not done on a channel basis. Allocation of slots including keeping slots of msg 3 by setting the keep flag have to be done completely separate for each channel. That means: a msg 3 on ch A can only allocate slots for ch A, and if keep flag is set, the slot has to be used on the same channel in the next frame. 05.09.02 Retest: ok now	ok

Timeout	Check that the assigned timeout is between 2 and 6	I can't understand the timeout handling: After rescheduling using msg 3 there is - 1 frame all slots using timeout 2, - the next frame all slots use timeout 0, - then 1 frame and 14 s all slots with different random timeouts Here is the end of msg type 2. The next frame has msg type 1, but assigned reporting rate timing out the assigned reporting rate. After that it start regularly using msg 3 to allocate the autonomous reporting rate 05.09.02 Retest: changed but not ok. See report of Johan Hartmann 12.09.02 Retest: timeout not yet ok. See report of Johan Hartmann and excel diagram. Timeout should be like it is after the frame with msg 1 and timeout 0. 10.10.02 Retest: no change, same behaviour of time-out 30.10.02 Retest: Time-out is ok	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	Msg 16 is received at UTC: 15:41:49 15:43:48 15:45:43 15:47:40 15:51:43 End of assigned mode, 4 minutes after last 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	Note: After end of assigned mode reporting rate is not changed back to 10 s, it remains on the (higher) assigned reporting rate 10.10.02 Retest: no change, remains at higher reporting rate 30.10.02 Retest: Reporting rate is set back to 10 s	ok

Date	Result	Status
17.07.02 05.09.02 12.09.02	Fundamental errors, mainly in timeout handling Retest: mainly ok, but error in timout handling at the end of assigned mode Timeout not yet ok, additional failure: not swiching back to normal reporting rate, maybe the same problem as not switching back after increase of reporting rate caused by heading change.	
10.10.02	Slot assignment ok	ok
10.10.02 30.10.02	Rate assignment no change Rate assignment ok	 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.

05.11.02	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	Output of VDM In is not required to output msg 16 only if addressed to the own station. We recommend not to output all messages which are addressed to other stations, independend of the msg type, to reduce the load of PI interface. 29.11.02 Retest: no VDM output if not addressed	ok
Wrong MMSI	Check that the EUT does not change the reporting rate	Not changed	ok

I think I have completely missunderstood this test.

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.

05.11.02	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 = 22, slots = 7, 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

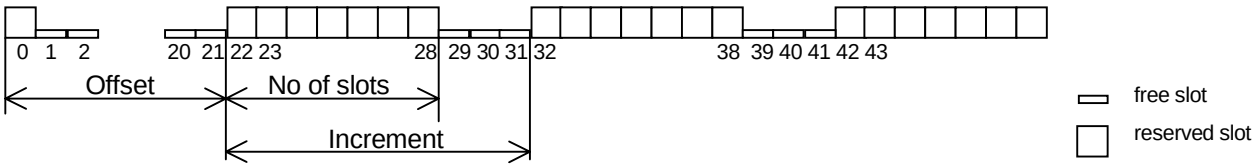
Confirm that EUT does not use slots allocated by msg 20 for own transmissions until timeout of 4 to 8 min.

12.09.02	Test details – Fixed allocated transmissions (FATDMA)		
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	Could not be tested tested because it stopped transmission on the channel on which it received msg 20 10.10.02 Retest: Transmission is not stopped Timeout is not forced to 0 Only the free slots are used	Ok Acc ok

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: 22
- Time out 1: 3
- Number of slots: 7
- 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.

05.11.02	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.			
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)		

05.11.02	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.			
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		----
Communication state	Check the field content		
	The communication state is checked in 4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)		

05.11.02	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.			
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

05.11.02	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.			
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

05.11.02	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.			
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 Ok
Sequence number 4	Check the field content		

05.11.02	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.			
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

05.11.02	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.			
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

05.11.02	**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.			
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Destination ID 1 (MMSI)	Check the field content		Ok
Msg11 response	Check for response with msg 11 if EUT is addressed		Ok
Msg11 response	No response if addressed to other station		Ok

05.11.02	**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.			
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

05.11.02	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.			
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

05.11.02	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.			
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

05.11.02	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.			
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Safety related text	Check the field content		Ok

05.11.02	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			
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

05.11.02	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.			
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

05.11.02	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.			
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

05.11.02	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.			
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
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		--
Slot increment	Check the field content		--
Number of slots	Check the field content		--
Keep flag	Check the field content		--

05.11.02	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.			
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 carge	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

05.11.02	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.			
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

05.11.02	**Test details – Content of msg 21 ATON report**		
Test item	**Check**	**Remark**	**Result**
Transmit a msg 18 from VDL generator. Check the field content of the fields listed under Test item.			
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		---
Assigned mode flag	Check the field content		---
Name of AtoN extension	Check the field content		---

05.11.02	**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.			
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	Ok
Msg 19	Yes	Ok	No	Ok
Msg 20	Yes	Ok	Has to avoid using reserved slots	4.6.5
Msg 21	Yes	Ok	no	Ok
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

05.11.02	**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			
			Ok

05.11.02	**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.			
			Ok

05.11.02	**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.			
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

05.11.02	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.			
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		

05.11.02	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.			
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

05.11.02	Test details – Content of msg 10 UTC and date inquiry		
Test item	**Check**	**Remark**	**Result**
activate transmission of msg 10 if implemented (not required)			

05.11.02	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.			
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

05.11.02	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.			
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

05.11.02	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.			
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		

05.11.02	**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.			
Message ID	Check the field content		Ok
Source ID (MMSI)	Check the field content		Ok
Safety related text	Check the field content		Ok

05.11.02	**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.			
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		Ok
Message ID 2.1	Check the field content		Ok
Slot offset 2.1	Check the field content = 0		Ok
			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.

	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*

30.10.02	**Test details – 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. 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
MKD display defined area	Check that the defined area is correctly displayed on MKD or output as ACA on request	Area is stored for a short time, then deleted. ACA output: Channels are ok, Transition zone: 1 has to be added. Lat and lon value is incorrect: The integer value of the msg 22 devided by 1000 is entered in the ACA 30.10.02 Retest: Stored area is displayed correctly on MKD. Source of setting is not displayed	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 ACA output	ACA of default region (not in use) and ACA of R2 (in use) is output at border of R2	ok
	Check that EUT keeps transtional channels for 1 min. timing out the transmissions of AIS 1	Note: At this test item the EUT started with the restart state	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 ACA output	ACA of R2 (not in use) and ACA of R1 (in use) is output at border of between R1 and R2	ok
	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 ACA output	ACA of R1 (not in use) and ACA of default area (in use) is output at border of R1	ok
	Check that channels AIS1 and AIS2 are used		Ok
	Check that reporting rate is changed back to normal reporting rate		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.

05.09..02	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			
MKD display defined area	Check that the defined area is correctly displayed on MKD or output on PI in ACA sentence on request	No output of ACA, requested ACA output is ok, MKD output: area not displayed 30.10.02 Retest: Stored area is displayed correctly on MKD. Source of setting is not displayed	Ok
Item 1:	Check that channels AIS1 and AIS2 are in use		ok
Item 2: Move position into transitional area of region 1	Check that EUT keeps old channels for 1 min. timing out the transmissions of AIS2	Does not keep old channel for timing out the slots 30.10.02 Retest: ok	ok
	Limits of transitional zone: The TZ is 1 nm (= 1.15 minutes), area border at 13°W Border of TZ is at 13°01.15	The transitional zone seems to be 1.0 minute, not 1.0 nm 30.10.02 Retest: ok, border of transitional zone is between 1.1 and 1.2 minutes (1 nm=1.15 minutes)	ok
	Check that channel AIS 1 and A1 are used	Frequencies are AIS1 and A1	ok
	Check that reporting rate is doubled	Reporting rate is not doubled, but rescheduling on both channels is done 30.10.02 Retest: Reporting rate is doubled	ok
Item 3: Move position into region 1	Check that EUT keeps transtional channels for 1 min. timing out the transmissions of AIS 1	No timing out 30.10.02 Retest: ok, slots are released by timing out	ok
	Limits of transitional zone: The TZ is 1 nm (= 1.15 minutes), area border at 13°W Border of TZ is at 12°58.85	The transitional zone seems to be 1.0 minute, not 1.0 nm 30.10.02 Retest: ok, border of transitional zone is between 1.1 and 1.2 minutes (1 nm=1.15 minutes)	ok

	Check that channel A1 and B1 are used	If moving through the inner part of transitional zone the channels are B1 and AIS2, if moving directly from outer port of ZT into area, channels are A1 and B1 30.10.02 Retest: Channels A1 and B1 are used	ok
	Check that reporting rate is changed back to normal reporting rate	30.10.02 Retest: ok	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	Not doubled 30.10.02 Retest: Reporting rate is doubled	ok
Item 5: Move position into region 2	Check that channels A2 and B2 are used	At the border of the TZ to area 2 the channels AIS1 and AIS2 are used Inside area 2 the channels B1 and AIS2 is used 30.10.02 Retest: Channels A2 and B2 are used	ok
	Check that reporting rate is changed back to normal reporting rate	Not doubled 30.10.02 Retest: ok	ok
Move position into transitional area of region 2 to high sea	Check that channels A2 and AIS1 are used	Channels AIS1 and AIS2 are used 30.10.02 Retest: A2 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	30.10.02 Retest: ok	ok

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.

05.11.02	**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		Ok
Power low	Check that the transmitting power is changed from high to low	No change of output power 26.11.02 Retest: no change 06.12.02 Retest: Only channel B is transmitted with low power, channel A is transmitted with high power 13.12.02 Retest: both channels on low poser	ok
MKD	Check the low power settings are displayed on MKD	Display shows high power, VDM output is ok showing the correct address and settings 26.11.02 Retest: no change 06.12.02 Retest: Display shows low power for both channels.	ok
Transmitt the same message 22, but power setting to 0 = high power			
Power high	Check that EUT reverts to high power	06.12.02 Retest: TXT output, ACA output and MKD display ok indication high power, Output power is also high on both channels	ok
Note	This seems to be not a problem of power setting but a problem of addressing by using the lat/lon field for addressing. Also other items like channels are not changed with the addressed message. The address of the message is: Lon=1, Lat=61056 (32*1908). The factor 32 represents the 5 trailing 0. The address is composed by: 1*4096 (Lon) + 1908 (Lat without add. 0) = 6004 (the actual MMSI) 26.11.02 Retest: Addressing is ok now		ok

05.11.02	Test details – Power setting by ACA		
Test item	**Check**	**Remark**	**Result**
Apply the following message at PI: File name = AIACA_set_channel.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		Ok
Transmitt the same ACA sentence, but power setting to 0 = high power			
Power high	Check that EUT reverts to high power	06.12.02 Retest: When setting from low to high power only the channel B was set to high power. Channel A transmits with low power. MKD and TXT indication is ok, both channels indicate high power. 13.12.02 Retest: both channels are set to high power	ok

05.11.02	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	Power level can not be changed manually 26.11.02 Retest: Power can be set to low power	ok
Set power level back to high power.			
Power high	Check that EUT reverts to high power	Power level can not be changed manually 26.11.02 Retest: Power can be set to low 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).

5.11.02	**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 under normal conditions	Check that msg 12 is transmitted first because of higher priority	Test could not be performed because EUT could not handle transmission of the long msg 8. See log file of PI output 29.11.02 Retest: ok: The transmission order is correct but there seems to be no ABK output in case the repetition of the addressed message is stopped because of the rule to send not more then 20 slots in one frame. 13.12.02 Retest: There are now 2 ABK: one for the missing acknowledgement from the addressed station, one for the messages which could not be sent because of the max. 20 slots rule	Ok ok
Transmission order under normal conditions	Check that msg 12 is transmitted first because of higher priority		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.

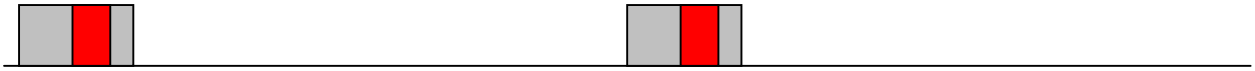
Required results

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 2 blocks of 60 targets in consecutive slot are transmitted. To avoid problems by system overloading every 10th slot is not used. One block is transmitted at the beginning of the frame and one at the middle.
The EUT is set to 2 s reporting rate. So the 1st and the 15th selection interval is covered by these transmissions of the same targets.



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

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,
- the odd numbered targets have a high distance to the EUT

In addition 4 slots within the selection intervals are reserve by a message 20.

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 selection interval 1 and 15 at time-out have to be checked.

12.09.02	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	Could not be tested because EUT stops transmission on the congested channel, Could be the same problem as stop of transmission in case of reserved slots 06.11.02 Retest: Slots are in the range of 37...44 = 7 slots. The SI is 15 slot	ok
Slot reuse	Check that only the slots of odd numbered targets are used	06.11.02 Retest: In 9 of 36 selections (25%) the slot of a even (near) targed is used. It attracts attention that 6 of the 9 even targets are target 44. It has been checked that in all cases the even targets have been received in the 2 frames before the selection. The listing of the slot reuse test and the PI output log is available 25.11.02 Retest: No improvement: in 7 of 29 cases (24%) an even (near) target is used for slot reuse. In all cases the target has been received in the 2 frames before slot selection (check of PI output). PI output log is provided. 05.12.02 Retest: Has been improved but in 3 of 27 cases (11%) even (near) targets are used for slot reuse. 13.12.02 Retest: Only distant targets are used now Another new problem: see note 13.12.02 Retest: There are now 4 different targets used for slot reuse	Ok ok

	Check that a the slot of a target is not used twice in a frame	In the minute 12:11 the target 43 is selected 3 times in the same frame. In the minute 12:25 the target 41 is selected twice in the same frame. 25.11.02 Retest: No tragets used twice in the same frame 13.12.02 Retest: In one case (minute 08:37) the target 45 was selected twice in a frame, in the 1st and 2nd block. 20.12.02 Retest: Two MDS log file of longer periodes of some hours have been checked and no case found where a target was selected twice in a frame	Ok acc
Reserved Slot	Check that slots reserved by msg 20 are not used		----

Note: only target 55 and 57 are used for slot reuse (+target 58). The EUT should select 4 candidate slots for slot selection. It should randomly select 1 of these 4 candidate slots for transmission. It seems that the transponder has only 2 candidate slots and is alternating between these 2 slots instead of randomly selecting 1 of 4 slots.
It are the same for the 3 selection intervals. This should be checked.
13.12.02 Retest: There are now 4 different targets used for slot reuse

5.7 17.7 Management of received regional operating settings

(7.4.1)

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.

06.11.02	**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		ok
	Check that all 8 areas are output on PI after request by sentence xxAIQ,ACA		ok
a) Send a 9. msg 22 to the EUT	Check that the first area is deleted	The last area is deleted 26.11.02 Retest: The first message is deleted	ok
	Check that the EUT returns to the default operating settings	Because the first area was not deleted operating settings are not changed.	
b) step 1: Set own position to one of the 7 areas (channel 60)	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 (msg 22 7.7.1b)	Check the overlapped area is deleted and replaced by the new one	The old area is deleted but the new one is not added 26.11.02 Retest: The old area is deleted and replaced by the new one	ok
	Check that the EUT reverts to the default operating settings	Reverts to default operating settings because the area has been deleted.	ok

d) Erasure by distance: 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
Check of erasure: 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	Checked by ACA and MKD	ok
Note:	Does not accept ACA sentence with channel numbers like 72 or 74. Channel numbers 1072 and 1074 are accepted 26.11.02 Retest: This is correct, the channel numbers are fixed length fields of 4 characters.		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.

07.11.02	**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 (Area			
a) Use of settings	Confirm that the EUT uses the regional operating settings commanded by msg 22	MSG 22: Ch A = 1061, Ch B=2061 MKD and ACD: Ch A = 1061, Ch B=2061 TXT: VDL 1: 160.675=2061 VDL2: 156.075=2061 VDO and VDM: A=2061, B=1061 26.11.02 Retest: No change. The VDO and VDM indication should be according to the channels A and B as assigned by the base station. 06.12.02 Retest: • Moving into an area directly or via transitional zone: ok • Starting up inside an area: inverted channels in VDO 13.12.02 Retest: In 4 startups it was always ok • Applying ACA sentence, position inside the ACA area: ok	Ok ok 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.	Can be changed, but changes are ignored after confirmation with "yes" softkey (see 2.10.3) 08.10.02 Retest: The changes of area settings are accepted	ok
	Check, that the EUT does not accept incomplete or invalid regional operating settings.	Cannot be checked because all settings are ignored 08.11.02 Retest: ok	---
	Check, that the EUT accepts a complete and valid new regional operating setting.	Does not accept any settings 08.11.02 Retest: ok	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 EUT gives no choice between return to editing and abort the changes. When pressing "no" at confirmation request all changed date are aborted and reset to the previous values 26.11.02 Retest: No change	rec
Move position inside the new area	Step 4: Check, that the EUT uses the regional operating settings input via the MKD.	Cannot be checked because area is not accepted 08.11.02 Retest: ok	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	All inputs are ignored after confirmation with "yes" softkey 08.11.02 Retest: ok	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	No entering of default settings possible	ok
	Check, that the EUT uses the default operating settings		----
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.	The ACA sentence is accepted and the VDL area is not deleted. Therefore 2 overlapping areas are stored. 26.11.02 Retest: The ACA area is not accepted	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.

07.11.02	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	Change was not accepted. VDM output is ok 26.11.02 Retest: New settings (channel 65 instead of 61) are used	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	26.11.02 Retest: New settings are not accepted, neither as ID1 nor as ID2 in msg 22 26.12.02 Retest: With ID 1 and ID 2 ok	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 (three regional operating 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.

07.11.02	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		ok
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
07.11.02	documentation 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.

7.11.02	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		Ok
Slot assignment command in a transitional zone	Check that an slot assignment command is ignored in a transitional zone		ok

Date	Result	Status
07.11.02	After moving position from R2 into transitional zone: Channels A1 and B2 are in use. According to IEC 61993-2 the channels A1 and A2 should be used 26.11.02 Retest: A1 and A2 are in use	 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.

03.09.02	**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	Only send via Channel A Retest 6.10.02	 Ok

07.11.02	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: 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

07.11.02	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 1. 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.		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
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	$AIABK,00008001,A,6,0,0 $AIABK,00008001,A,6,1,0 $AIABK,00008001,A,6,2,0 $AIABK,00008001,B,6,3,0	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.

07.11.02	**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		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**"**

07.11.02	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		
Number of repetitions	Note and check the number or repetitions	Msg 6 was repeated 2 times after first transmission (3 transmissions) Should be repeated 3 times 27.11.02 Retest: 3 repetitions now, in total 4 transmissions	ok
Repetition timing	Record the repetition timing. Note the time between repetitions and check that it is 4...8 s	Time to first transmission = 2 s, time between 2 transmission = 4 s	ok
ABK sentence	Note and check the ABK sentence Confirm the type = 1 (broadcast but no acknowledgement)		ok
Message sequence numbers	Check message sequence numbers of transmissions and ABK		ok

07.11.02	Test details - Addressed binary 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		
Number of repetitions	Note the number or repetitions	Msg 12 was repeated 2 times after first transmission (3 transmissions) Should be repeated 3 times 27.11.02 Retest: 3 repetitions now, in total 4 transmissions	ok
Repetition timing	Record the repetition timing. Note the time between repetitions and check that it is 4...8 s	Time to first transmission = 24s, time between 2 transmission = 6 s and 7s	ok
ABK sentence	Note and check the ABK sentence Confirm the type = 1 (broadcast but no acknowledgement)		ok

Message sequence numbers	Check message sequence numbers of transmissions and ABK		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

07.11.02	**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		Ok
Transmission of acknowledgement msg 13	Check transmission of ackn. by VDO output of EUT		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.

07.11.02	**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	ok
Response channel	Check that the response is transmitted on the request channel		Ok

07.11.02	**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 = 100	ok
Response channel	Check that the response is transmitted on the request channel		Ok

07.11.02	**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 RUT			
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	Slot offset = 100	Ok
TX of response 2 (VDO)	Check that response is transmitted by EUT (VDO)		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	Slot offset = 200	Ok

07.11.02	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)		Ok
TX of response (VDO)	Check that response msg 5 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 2.1 is used	Slot offset = 200	ok

07.11.02	Test details - case 4 - Interrogation of msg 3		
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)		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	Slot offset = 300	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

18.07.02	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_bin_5.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		Ok
Channel	Check Tx alternating channels A and B	All transmissions on channel A, should be alternating for channel 0 Retest 6.10.02	Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,00000000,A,8,7,3 $AIABK,00000000,A,8,8,3 $AIABK,00000000,A,8,9,3 $AIABK,00000000,A,8,0,2 $AIABK,00000000,A,8,1,3 The MMSI has to be a null (empty) field Why has the last message not been transmitted??? Retest 6.10.02	Ok
Message sequence number	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
MMSI	Check Transmitter MMSI		Ok

18.07.02	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_bin_5.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		Ok
Channel	Check Tx alternating channels A and B	All transmissions on channel A, should be alternating for channel 0 Retest 6.10.02	 Ok
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,00000000,A,14,3 $AIABK,00000000,A,14,3 $AIABK,00000000,A,14,3 $AIABK,00000000,A,14,2 $AIABK,00000000,A,14,3 The MMSI has to be a null (empty) field Why has the 4th message not been transmitted??? Retest 6.10.02	 Ok
Message sequence number	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Ok
MMSI	Check Transmitter MMSI		Ok

Date	Result	Status
18.08.02	ABK: MMSI field shall be a null (empty) field, Channel should be alternating in case of channel 0	
6.10.02	Retest	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.

13.9.02	**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*

18.11.02	**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 check of contents , format only	Ok
Usage of Fields	Check usage of fields	Not yet in manual 19.12.02 Retest: ok	Ok
Transmission intervals	Check transmission intervals	Not yet in manual 19.12.02 Retest: ok	Ok
Hardware configuration	Check hardware configuration	Not yet in manual 19.12.02 Retest: ok	Ok
Output drive capability	Check output drive capability	Not yet in manual 19.12.02 Retest: ok	Ok
Input load	Check input load	Not yet in manual 19.12.02 Retest: ok	Ok
Electrical Isolation	Check electrical isolation	Not yet in manual 19.12.02 Retest: Indicated by circuit diagram Rec: Add information about electrical isolation to 1.2.12 "Listener and Talker Specifications" of the Technical Manual	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.

18.11.02	**Test details - Electrical test of inputs**		
Test item	**Check**	**Remark**	**Result**
Minimum voltage	Check that input works with minimum input voltage	ok for 61162-1 ports high speed ports are functionally compliant with 61162-2, hardware with 61162-1	Ok Nok
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	Documentation check	Ok

7.4 19.4 Test of input sensor interface performance

(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

06.12.02	**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

7.5.1 GLL sentence

	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	No display of PA-Flag	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	No display of differential mode	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 = "-----"	The default value 91° is displayed. A display like "---" would be better	Ok
	Check longitude = "-----"	The default value 91° is displayed. A display like "---" would be better	Ok
	Check PA-Flag = 0	No display of differential mode	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
Set status/mode to A,A Change for longitude the number of digits after decimal point from 2 to 6	Check that longitude on VDL is correct for all numbers		Ok
No GBS sentence applied	Check that RAIM-Flag = 0		Ok

7.5.2 GGA sentence

	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		Ok

	Check PA-Flag = 1 on VDL		Ok
Set mode =5 (RTK float Check on VDL	Short check data ok		Ok
	Check PA-Flag = 1 on VDL		Ok
Set mode = 6 (dead reck.) Check on VDL	Short check default data		Ok
Set mode = 7 (manual) Check on VDL	Short check default data		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

	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 = 91º		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok

7.5.4 RMC sentence

	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		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok
	Check SOG = 102.3		Ok
	Check COG = 360°		Ok

7.5.5 DTM sentence

	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	System should use the "Local Datum code" the field Reference Datum is used by the system Retest 13.09.02	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
Set Datum = WGS 84	To get valid data for further		Ok

	tests		

7.5.6 GBS sentence

	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			
	Check that RAIM-Flag = 1		Ok

7.5.7 VTG sentence

	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 on VDL	Check SOG		Ok
	Check COG		Ok
Check VDO output on PI	Check SOG		Ok
	Check COG		Ok
Check Display on MKD	Check SOG	Not required	--
	Check COG	Not required	--
Set mode to **D** (differential)	Short check SOG/COG ok		Ok
Set mode to **N (**invalid) Check on VDL	Check SOG = 102.3 (default)	Note : System use the internal GNSS Sensor for SOG and COG if Internal sensor is active.	Ok
	Check COG = 360 (default)	Note : System use the internal GNSS Sensor for SOG and COG if Internal sensor is active.	Ok
Check VDO output on PI	Check SOG = 102.3 (default)		Ok
	Check COG = 360 (default)		Ok
Check Display on MKD	Check SOG = "-----"	Not required	--
	Check COG = "-----"	Not required	--
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	SOG in kilometres has priority, Magnetic Heading not used	Ok

7.5.8 VBW sentence

	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	Incorrect SOG/COG if transverse or longitudinal speed =0 Retest 13.09.02	ok
	COG = calculated from SOG vector and heading	Incorrect SOG/COG if transverse or longitudinal speed =0 Retest 13.09.02	ok
Check on VDO output of PI	Check SOG = VDL SOG value	See above	ok
	Check COG = VDL COG value	See above	ok
Check on MKD	Check SOG = VDL SOG value	Not required	--
	Check COG = VDL COG value	Not required	--
Status of bottom track: **V** (invalid) Ahead and across speed not empty. Water speed valid ! Check on VDL	SOG from VTG		Ok
	COG from VTG		Ok
Check on VDO output of PI	SOG from VTG		Ok
	COG from VTG		Ok
Check on MKD	SOG from VTG	Not required	--
	COG from VTG	Not required	--
Status of bottom track: A (valid) Ahead available, **across speed empty (**e.g. single axis log)	SOG from VTG		Ok
	COG from VTG		Ok
Status of bottom track: A (valid) Ahead and across speed available, **Heading invalid**	SOG from VTG		Ok
	COG from VTG		Ok

	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	Incorrect SOG/COG if transverse or longitudinal speed =0 Retest 30.09.02	Ok
	COG = calculated from SOG vector and heading	See above	Ok
Check on VDO output of PI	Check SOG = VDL SOG value	See above	Ok
	Check COG = calculated from SOG vector and heading	See above	Ok
Check on MKD	Check SOG = VDL SOG value	Not required	--
	Check COG = calculated from SOG vector and heading	Not required	--
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	Not required	--
	COG = default	Not required	--
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		Ok
	COG = default		Ok

7.5.9 OSD sentence

	Test details – OSD own ship data input		
Test item	**Check**	**Remark**	**Result**
Apply simulated OSD sentence to the sensor input File name is ais07_osd.sst			

Heading status = A (valid) Speed reference = B (bottom) Check on VDL	Check SOG from OSD		Ok
	Check COG from OSD		Ok
	Check heading from OSD		Ok
Check VDO output on PI	Check SOG from OSD		Ok
	Check COG from OSD		Ok
	Check heading from OSD		Ok
Check Display on MKD	Check SOG from OSD	Not required	--
	Check COG from OSD	Not required	--
	Check heading from OSD	Not required	--
Set speed reference to P (Positioning system)	Check SOG and COG from OSD		Ok
Set speed reference to R Radar tracking	Check SOG and COG from OSD		Ok
Set speed reference to W (Water speed)	Check SOG = default		Ok
	Check COG = default		Ok
	Check heading from OSD		Ok
Set speed reference to M (Manual)	Check SOG = default		Ok
	Check COG = default		Ok
	Check heading from OSD		Ok
Set speed reference to P (Positioning system) Set **heading status = V** (invalid)	Check SOG from OSD		Ok
	Check COG from OSD		Ok
	Check heading = default		Ok
Change speed reference from N (kn) to K (km/h)	Check SOG value in VDL It has to be converted into knots		Ok

7.5.10 HDT sentence

	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	Not required	--
Change value to 359.9	Check that heading on VDL = 359 or 0, **not 360**	Value is 359	Ok
Delete heading value (empty field)	Check that heading = default on VDL		Ok
	Check that heading = default on VDO		Ok
	Check that heading = default on MKD	Not required	--

7.5.11 ROT sentence

	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	Not required	
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)		Ok
	20 converted to 19.7 (21)		Ok
	60 converted to 61.1 (37)		Ok
	180 converted to 177.2 or 182.8 (63/64)	Value is 177.2	Ok
	360 converted to 361.6 (90)		Ok
	720 converted to 708.7 (126)		Ok
	-20 converted to 19.7 (-21)		Ok
	-720 converted to –708.7 (-126)		Ok
Set ROT status = **V** (invalid)	Check that ROT = default on VDL (default = -731.4 = -128)	ROT shows 0 instead of default Because heading is used If Haeding and Rot are invalid then default value is used Ok	Ok
	Check that ROT = default on VDO	ROT shows 0 instead of default Because heading is used	Ok
	Check that ROT = default on MKD	Not required	--
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	Not required	--
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		Ok
	11 converted to 720		Ok
	- 9 converted to 0		Ok
	-11 converted to -720		Ok

7.5.12 Additional Tests

	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		Ok
	Check SOG/COG		Ok
	Check heading		Ok
	Check ROT		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	System detects new baud rate automatically	Ok
	Check SOG/COG = default	See above	Ok
	Check heading = default	See above	Ok
	Check ROT = default	See above	Ok
Set baud rate of simulator and sensor input also to 38 400, check on VDL	Check position	See above	Ok
	Check SOG/COG	See above	Ok
	Check heading	See above	Ok
	Check ROT	See above	Ok

7.5.13 Check of different inputs

	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	Check position		Ok
	Check SOG and COG		Ok
• 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 heading		Ok

	Check ROT		Ok

7.5.14 Sensor sentences overview

	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 Some remarks
GGA		optional	Yes	Ok
GNS		required	Yes	Ok
RMC		required (COG)	Yes	Ok
DTM		required	Yes	Retest ok
GBS		required	Yes	Ok
VTG	Velocity True Ground	optional	Yes	Ok Some remarks
VBW	Velocity Bottom Water	required	Yes	Retest ok
OSD	Own Ship Data	optional	No	Ok
HDT	Heading	required	Yes	Ok
ROT	Rate of Turn	required	Yes	Retest ok

Date	**Result**	**Status**
28.08.02 **13.09.02**	Failures in DTM VBW and ROT **Retest**	 **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.

Date	Format	Result	Status
	VDM	See test details below	Ok
	VDO	See test details below	Ok
	ALR	Test is done in 2.9 Alarms and indicators	
	ABK	Test is done in 2.1.4.1 and 6.1 Addressed operation and in 2.2 and 6.4 Broadcasts messages	
	ACA	Test is done in 5.3 Management of regional area settings	
	TXT	Test is done in 2.9 Alarms and indicators	

13.09.02	**Test details - Message content of VDM messages**		
Test item	**Check**	**Remark**	**Result**
Transmit a position report from VDL analyser or another AIS transponder Check the following items on VDO output on PI compared with the transmitted values			
VDM Header	Check the total number of sentences = 1		Ok
	Check the sentence number = 1		Ok
	Check the Sequential message identifier = Null field		Ok
	Check the AIS channel = A, B		OK
	Check the number of fill bits = 0		OK
Message ID	Check the message ID = 1		Ok
MMSI	Check MMSI		Ok
Navigational status	Check the navigational status		Ok
ROT	Check the rate of turn		Ok
SOG	Check the Speed over Ground		Ok
Position accuracy	Check the Position accuracy		Ok
Position Longitude	Check the Position Longitude		Ok
Position Latitude	Check the Position Latitude		Ok

COG	Check the COG		Ok
Heading	Check the Heading		Ok
Time stamp	Check the Time stamp		Ok
RAIM flag	Check the RAIM flag		Ok
Communication state in SOTDMA (msg 1)	Check the sync state		Ok
	Check the Slot time-out		Ok
	Check the received stations		Ok
	Check the slot number		Ok
	Check the UTC time		Ok
	Check the Slot offset		Ok
Communication state in ITDMA (msg 3)	Check the sync state		Ok
	Check the Slot increment		Ok
	Check the number of slots		Ok
	Check the keep flag		Ok

	Test details - Message content of VDO messages		
Test item	**Check**	**Remark**	**Result**
Check the following items of msg 1,3 on VDO output on PI compared with the transmitted values of the own transmission according to the sensor input data			
Output rate	Check that the output rate = 1 s According to IEC 61993-2 §7.6.3.4 the output rate shall be 1 s		Ok
VDO Header	Check the total number of sentences = 1		Ok
	Check the sentence number = 1		Ok
	Check the Sequential message identifier = Null field		Ok
	Check the AIS channel = A, B if transmitted, else empty		Ok
	Check the number of fill bits = 0		Ok
Message ID	Check the message ID = 1		Ok
MMSI	Check MMSI		Ok
Navigational status	Check the navigational status		Ok
ROT	Check the rate of turn		Ok
SOG	Check the Speed over Ground		Ok
Position accuracy	Check the Position accuracy		Ok
Position Longitude	Check the Position Longitude		Ok
Position Latitude	Check the Position Latitude		Ok
COG	Check the COG		Ok
Heading	Check the Heading		Ok
Time stamp	Check the Time stamp		Ok
RAIM flag	Check the RAIM flag		Ok
Communication state in SOTDMA (msg 1)	Check the sync state		Ok

	Check the Slot timeout		Ok
	Check the received stations		Ok
	Check the slot number		Ok
	Check the UTC time		Ok
	Check the Slot offset		Ok
Communication state in ITDMA (msg 3)	Check the sync state		Ok
	Check the Slot increment		Ok
	Check the number of slots (0 = 1 slot)		Ok
	Check the keep flag		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
08.11.02	Could not yet be done because of interfacing problems with the VDL generator	
06.12.02	fixed, Test ok	ok

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
	VSD	See test details below	Ok
	SSD	See test details below	ok
	ABM	Test is done in 2.1.4.1 and 6.1 Addressed operation	
	BBM	Test is done in 2.2 and 6.4 Broadcasts messages	
	ACA	Test is done in 5.3. Management of regional area settings	
	ACK	Test is done in 2.9 . Alarms and indicators	
	AIR	Test is done in 2.1.3.1 . Interrogation	

	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
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		Ok
	Check that the new dimensions are displayed on MKD		Ok
DTE indicator flag	Check if the DTE flag is entered in VDL message 5 Not required		

	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
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

Date	**Result**	**Status**
01.11.02		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.

10.09.02	**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	No response 10.09.02 Retest: Response received, but transmitter MMSI in response is coded with a leading additional 0 The response seems to be not transmitted immediately but after a certain delay up to 1 minute 30.10.02 Retest:: Immediate response. Note: Name and position are transmitted in separate messages according to note 2 from MDS	Ok 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	Not answered 30.10.02 Retest: call is answerd	ok
	26.11.02 Retest: No response on any call from the EUT. Regional settings are correctly stored but not acknowledged. 06.12.02 Retest: Problem caused by power supply. With stronger power supply ok		ok

10.9.02	Test details (b) – Sequence of 5 calls		
Test item	**Check**	**Remark**	**Result**
Set reporting interval to 2 s and record VDL			
Start DSC transmission of test sentence File name is "\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 slots) Transmit test signal 1	Check that no responses are transmitted by the EUT		ok

10.09.02	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	The request is answered also if the additional 0 of the MMSI is not 0	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		Ok
Delete course, add matching type of ship	check that call is answered		Ok
Change type of ship to All ships of this type	check that call is answered	No response 30.10.02 Retest: Call is answered	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	No response if longitude is 179.59 W, ok if lon. is 179.59E 30.10.02 Retest: Response also at if longitude is 179.59 W	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
all ships call 116 with EOS 117	Check that EUT does not transmit a response	Response received 30.10.02 Retest: no answer	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.

10.09.02	**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	No acknowledgement received 30.10.02 Retest: Ackn with symbol 112 received	ok
	Check that an ACA sentence is output at PI port	30.10.02 Retest : ACA output ok	ok
	Check that new region is stored in the region list of the EUT	Not stored 30.10.02 Retest: Area is stored	ok
	Check that transition zone is 5 nm		ok
Send a area addressed region setting call File name “area_set_region.sst”	Check that an acknowledgement is received	No acknowledgement 30.10.02 Retest: Ackn with symbol 112 received	ok
	Check that an ACA sentence is output at PI port	30.10.02 Retest : ACA output ok	ok
	Check that new region is stored in the region list of the EUT	Not stored 30.10.02 Retest: Area is stored	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	No ACA output indicating the changed channels MKD shows the old frequencies (I assume because it received no new ACA sentence) TXT output shows the correct frequencies of channe 65: 156.275 and 160.875 MHz 26.11.02 Retest: ACA output indication the use of the new channel 65. MKD shows the new frequencies	ok
	Check that new AIS channels are used for transmission and reception	On channel A the correct frequency of 156.275 kHz is used for transmission, on channel B the frequency 160.875 MHz is not used. 26.11.02 Retest: The channel 65 is used for RX and TX. Note) The frequency of channel A is used for channel B and vice versa	ok
Apply the same sentence if the EUT is outside an area	Check that the channel setting command is ignored	Command is ignored, now Acknowledgement and no channel switching	ok

26.11.02	**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. 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		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.

	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	Nearly only the first 6 seconds after request are used for response. The response should be transmitted in a even distribution over 20 s. See histogram/diagram 26.11.02 Retest: not possible, no response on any call 06.12.02 Retest: Distribution is ok now	ok
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		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.

10.09.02	**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)	Check that immediate response with EOS=BQ is received	EOS = RQ (117) 30.10.02 Retest: EOS = BQ (122)	Ok
	Check automatic reporting rate	No automatic report 30.10.02 Retest: automatic report is transmitted	ok
	Check that further TX are transmitted with EOS = RQ (117)	30.10.02: EOS = RQ	Ok
	Check that automatic reporting is finished after 5 transmissions (without ackn. by base station)	30.10.02: Automatic reporting is finished after 5 repetitions	Ok
	Check that the automatic reporting is not finished with ackn. by base station.		
Send message with 102+00	Check that the automatic position report is finished	30.10.02: Ackn with symbol 112	ok
Request position (103)	Check position in response		ok
	Check time		Ok
	Check type of ship	Not included	ok
Request length of ship (108=6Ch)	Check length of ship (124=7Ch)	Length value is ok, but response after more than 40 s 30.10.02 Retest: Immediate response	Ok 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)	No reply 30.10.02 Retest: Response ok, speed ok	ok
(C) Request test signal 1 (pos, name request) + 109 + 116 (6F 67 6D 74))	Check automatic response submitting name, position, course and speed	Only course and name are reported, Information is reported in different messages, 1 message for each report type 30.10.02 Retest: All information is responded Note: Name is transmitted in a separate messages according to note 2 from MDS	ok
Send 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		ok
Send 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		ok

10.09.02	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)	Check position in response	The TDMA default value is transmitted, not 126 30.10.02 Retest: 126 is responded	ok
Request length of ship (108)	Check length of ship (124)	The TDMA default value is transmitted, not 126 30.10.02 Retest: 126 is responded	ok
Request course (109)	Check course (119)	The TDMA default value is transmitted, not 126 30.10.02 Retest: 126 is responded	ok
Request ships name (111)	Check name (115)	Not tested 30.10.02 Retest: 20x126 is responded, only one symbol 126 should be responded 26.11.02 Retest: not possible, no response on any call 06.12.02 Retest:ok, Response with 1x126	ok
Request speed (116)	Check speed (120)	No reply 30.10.02 Retest: 126 is responded	ok

10.09.02	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)	Check that response is transmitted on channel 70		ok
Set channel (101+88) (65 58)	Check that response is transmitted on channel 70		ok
Set channel (104+00+2087) (68 00 14 57)	Check that response is transmitted on channel 70		Ok
Set channel (104+00+2088) (68 00 14 58)	Check that response is transmitted on channel 70		Ok

06.12.02	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
ON CH5 = Pilot port	Check that the EUT does not transmit a DSC message.		ok

06.12.02	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)	Check that response is transmitted with low power	The response is not yet transmitted with low power but TXT shows that the command is accepted. After some time (about 30 s) further DSC calls are transmitted with low power. TDMA channels are also set to low power in TXT and on Display but transmission is done with high power (ok) The Indication and Transmission power should be the same 13.12.02 Retest: TDMA msg are transmitted with low power	Acc ok
Ad symbols to set power = 12.5 watt (low power) (Symbols 104+ 01+ 12)	Check that response is transmitted with high power	Same as for low power 13.12.02 Retest: TDMA msg are transmitted with low 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*

03.09.02	**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		Ok
Display on MKD	Check that the request is displayed on MKD	On main display the number of messages is indicated.	Acc
	Check that replay status is displayed on MKD	Found only in the message log	Acc
PI output	Check that LR interrogation and response is output on PI		Ok
Contents of LRF response	Check output of LRF sentence		
	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.)		Ok
Contents of LR1 response	Check output of LR1 sentence		Ok

	Check that sequence number = request = LRF		OK
	Check own MMSI		Ok
	Check MMSI of responder = responder of request		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 own MMSI		Ok
	Check date, UTC	Instead of 02 00 is displayed Retest 13.9 corrected	Ok
	Check Lat, Lon		Ok
	Check COG		Ok
	Check SOG	0.1 sent as 1 kn 0.2 Retest 13.9 corrected	Ok
Contents of LR3 response	Check output of LR3 sentence		
	Check that sequence number = request = LRF		Ok
	Check own MMSI		Ok
	Check destination		Ok
	Check ETA	Displayed time as date and date as time Retest 13.9.02 changed Note that Year is transmitted as 00 allways because not provided by VSD input	ok
	Check draught	8.5 displaed as 85 Retest 6.10.02	Ok
	Check ship/cargo		Ok
	Check length of ship	Always 107 instead of A + B has to be 145 08.11.02 Retest: ok	ok
	Check breadth of ship	Retest 6.10.02	Ok
	Check ship type		Ok
	Check persons		Ok

03.09.02	**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 only LF and 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 only LF 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 only LF 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

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	In message log the request is found and then a response is possible; popup window required Retest 6.10.02	ok
	Check that response is transmitted after manual confirmation on MKD	Only in message log 26.11.02 Retest: Did not succeed sending a LR response by manual confirmation I pressed the "reply" button, and the mark in the LR list was changed from x to "√", but no data were output on LR port. In automatic mode there was no problem 27.11.02 Retest: ok, I don't know what went wrong yesterday, but now it's ok	ok

03.09.02	Test details – Confirmation via PI		
Test item	**Check**	**Remark**	**Result**
Set EUT to external response if implemented (not required). 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		Ok
	Check that response is transmitted after external confirmation via PI		OK

Date	Result	Status
03.09.2002	Some small problems with data, no MKD output at manual mode 26.11.02 Retest: In manual mode a popup window shows that LR request is pending Switching from one mode to the next MKD is not updated 26.11.02 Retest: ok In message log the sign 'x' for logs in automatic mode has to be change to 'v' 26.11.02 Retest: ok	ok
6.10.02 08.11.02	Retest Only problems with ship length calculation Retest: Ship's length is taken from ref. of internal sensor.	ok
1.11.02 08.11.02	Note : EUT is using internal EPFS for LR interrogations even if the external EPFS is available (position, calculation of ship length etc.) Retest: ok, the source of position data is correct	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.

03.09.02	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	Only msg count is inc.	Acc
	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

03.09.02	Test details – Area addressing – Manual confirmation		
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 displayed on MKD	In message log the request is found and then a response is possible Retest 6.10.02	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

Date	Result	Status
03.09.2002	No MKD output at manual mode 26.11.02 Retest: In manual mode a popup window shows that LR request is pending	
06.10.02	Retest	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.*

	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

Annex A Test equipment

A.1 Test equipment summary

#	description	type	identification
1	VDL analyser / Generator	Attingimus UAIS Test unit	S/N 001 BSH PC5593 SW AISterm V1.0rev47 AISmain V1.47011120R
2	Target simulator	Simutech	BSH PC3007 SW BSHSIM7T
3	Presentation Interface Monitor	BSH	BSH PC 3481 BSH PC 3544 SW NewMoni V2.1
4	DSC Testbox	DEBEG 3817 DEBEG 6348	S/N 475533
	Auxiliaries:		
5	Digital Multimeter	Voltcraft	S/N 1010365036
6	Fluke Scopemeter	123	BSH 101275/2001
7	5 Converters RS 422 to RS 232		
8	1 fixed voltage power supply (24 V/10A)		
9	3 adjustable power supplies (30 V/5 A)		
10	active retransmitting GPS antenna		

for a description of pos. 1-4 see below

A.1.1 VDL analyser / generator

The VDL analyser/generator:

- receives the radio data telegrams transmitted by the AIS under test, slotwise evaluates their radio parameters (field strength, SNR, etc.) and provides a transparent display of the decoded radio data telegrams (VDL messages).
- transmits radio data telegrams which have been entered/edited via a control panel. The AIS under test receives these messages and either passes the received data to it's presentation interface and/or responds as appropriate.
- records all data contained in the received radio telegrams and radio parameters in a data base for offline evaluation and documentation purposes.
- simulates AIS targets by transmitting position reports of virtual targets up to the maximum channel capacity.

A.1.2 Target simulator

The target simulator consists of a standard PC with

- special Radar and Target Simulator software
- extension boards for generation of Radar signals and RS422 serial output signals

Connection of AIS Test system
For tests of AIS transponders the data of 60 moving targets defined in the Radar Simulator are transferred to the VDL Generator and transmitted on VHF. Thus the AIS VHF data link is loaded with simulated AIS targets.
Connection of display systems
Radar systems as well as ECDIS systems will have the ability to receive, process and display AIS information in the near future. In order to test this feature the data of moving targets defined in the Radar Simulator are transferred to the RADAR (together with video, sensor data etc as known).
Connection of AIS under Test
The AIS under test can be connected to the own ship sensor outputs in order to provide full control over own ships dynamic data (for tests of reporting rates, channel management...).

A.1.3 Presentation Interface Monitor

The Presentation Interface Monitor is a PC software running on two standard PCs.
It is used to

- simulate Sensor inputs
- analyse the AIS high speed input / output
- analyse the AIS long range function
- generate DSC calls for the DSC test box and to display, log and evaluate the received DSC calls from EUT.

For that purpose it includes the functions:

- coding / decoding of NMEA 6-bit data fields
- online AIS message filtering
- online AIS message editing
- load and transmit predefined sequences
- online modification of transmitted sequences

A.1.4 DSC Testbox

The DSC test box includes:

- A standard VHF DSC controller DEBEG 3817 with open interface
- A standard VHF radiotelephone DEBEG 6348

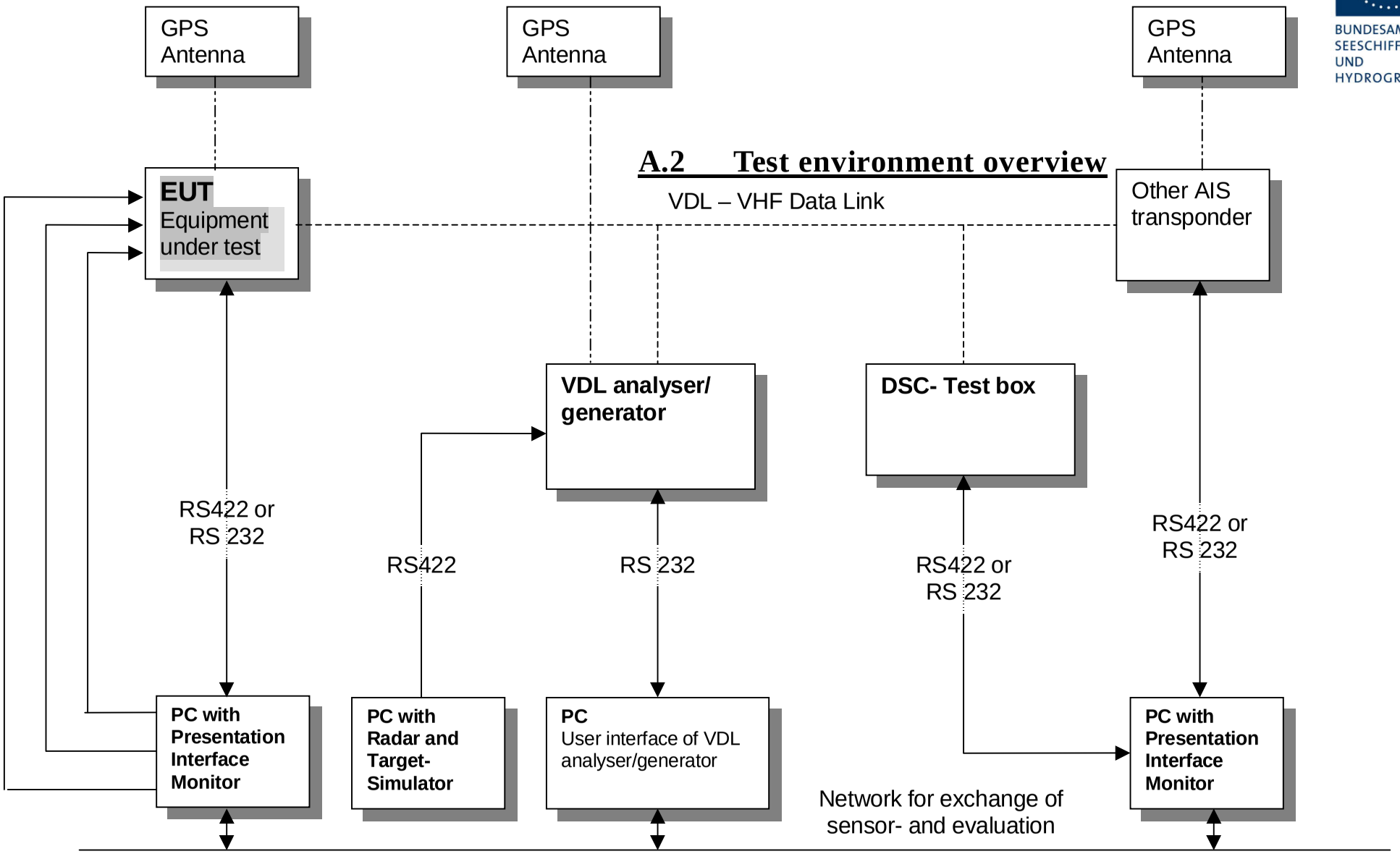
The software modification of the DSC controller comprises a remote control input/output facility

- to transmit DSC calls according to ITU 825-3 generated in an external device on DSC channel 70 and
- to output received DSC calls from the EUT to the external device.

The Presentation Interface Monitor is used to generate the DSC calls and to display, log and evaluate the received DSC calls.

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

A.2 Test environment overview



Annex B IEC 61162 test sentences

B.1 Sensor input

Sensor input sentences	
File name	Description
Sentences	
AIS01_gll_vtg_hdt_rot.sst	Standard sensor input sentences
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A $GPVTG,350.0,T,,M,10.0,N,,K,A $TIHDT,359.9,T $TIROT,0.0,A	
AIS01d_dtm_gll_vtg_hdt_rot.sst	Standard sensor input with DTM
$GPDTM,999,,,,,,,P90 $GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A $GPVTG,350.0,T,,M,10.0,N,,K,A $TIHDT,359.9,T $TIROT,0.0,A	
AIS01g_gll_vtg_gbs_hdt_rot.sst	Standard sensor input with GBS sentence
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A $GPVTG,350.0,T,,M,10.0,N,,K,A $GPGBS,141800.00,2.6,2.8,4.2,,,, $TIHDT,359.9,T $TIROT,0.0,A	
AIS01x_gll_vtg_hdt_rot_180.sst	Standard sensor input at Longitude of 180°
$GPGLL,0001.00,N,17959.00,W,141800.00,A,A $GPVTG,350.0,T,,M,10.0,N,,K,A $TIHDT,359.9,T $TIROT,0.0,A	
AIS02_gga_vtg_hdt_rot.sst	Sensor Input set with GGA position
$GPGGA,092854,5330.1234,N,01001.2345,E,1,3,1.2,65.2,M,45.1,M,,, $GPVTG,350.0,T,,M,10.0,N,,K,A $TIHDT,359.9,T $TIROT,0.0,A	
AIS02d_dtm_gga_vtg_hdt_rot.sst	Sensor Input set with GGA position and DTM
$GPDTM,999,,,,,,,P90 $GPGGA,092854,5330.1234,N,01001.2345,E,1,3,1.2,65.2,M,45.1,M,,, $GPVTG,350.0,T,,M,10.0,N,,K,A $TIHDT,359.9,T $TIROT,0.0,A	
AIS03_gns_vtg_hdt_rot.sst	Sensor input set with GNS position
$GNGNS,122500.00,5330.1234,N,01001.2345,E,AA,5,1.2,35.5,41.1,, $GNVTG,350.0,T,,M,10.0,N,,K,A $TIHDT,359.9,T $TIROT,0.0,A	
AIS04_rmc_hdt_rot.sst	Sensor input set with RMC position and speed

$GPRMC,122500.00,A,5330.1234,N,01001.2345,E,11.2,352.2,120202,2.0,E,A $TIHDT,359.9,T $TIROT,0.0,A	
AIS06_gll_vtg_vbw_hdt_rot.sst	Sensor input set with speed by VBW and VTG
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A $GPVTG,350.0,T,,M,10.0,N,,K,A $VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V $TIHDT,359.9,T $TIROT,0.0,A	
AIS07_osd.sst	Single OSD sentence
$INOSD,359.9,A,5.2,B,12.6,B,150.0,1.2,N	
AIS08_gll_vbw_hdt_rot.sst	Standard sensor input with VBW instead of VTG
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A $VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V $TIHDT,359.9,T $TIROT,0.0,A	
AIS09_gll_osd.sst	Sensor input set with GLL and OSD
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A $INOSD,359.9,A,5.2,B,12.6,B,150.0,1.2,N	
AIS10_gll_vtg.sst	GPS receiver sentences (GLL and VTG)
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A $GPVTG,350.0,T,,M,10.0,N,,K,A	
AIS11_vbw.sst	Log sentence VBW
$VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V	
AIS12_hdt_rot.sst	Gyro sentences (HDT and ROT)
$TIHDT,359.9,T $TIROT,0.0,A	

B.1.1 Settings (VSD,SSD)

Settings (VSD,SSD)	
File name	Description
Sentences	
AISSD_transpondertype.sst	Settings of static data, specific set for each transponder type
$AISSD,callsign,name,100,20,15,10,1,GP	
AIVSD_Hamburg.sst	Settings of voyage related data
$AIVSD,51,11.5,26,HAMBURG,131020,20,05,0,0	

B.1.2 Messages (ABM,BBM)

The addressed messages include a MMSI number which is changed according to the actual MMSI number of the EUT

Messages (ABM,BBM)	
File name	Description
Sentences	
AIABM_bin.sst	Standard addressed binary message
!AIABM,1,1,2,000001005,1,6,06P0test,0	
AIABM_safety.sst	Standard addressed safety related message
!AIABM,1,1,2,000001005,1,12,D5CD,0	
AIABM_4_bin.sst	Set of 4 addressed binary messages
!AIABM,1,1,3,000008001,1,6,06P0test,0 !AIABM,1,1,0,000008001,2,6,06P0test,0 !AIABM,1,1,1,000008001,1,6,06P0test,0 !AIABM,1,1,2,000008001,2,6,06P0test,0	
AIABM_4_safety.sst	Set of 4 addressed safety related messages
!AIABM,1,1,0,000001005,1,12,D5CD,0 !AIABM,1,1,1,000001005,1,12,D5CD,0 !AIABM,1,1,2,000001005,1,12,D5CD,0 !AIABM,1,1,3,000001005,1,12,D5CD,0	
AIBBM_bin.sst	Standard binary broadcast message
!AIBBM,1,1,6,1,8,06P0test,0	
AIBBM_safety.sst	Standard safety related broadcast message
!AIBBM,1,1,6,1,14,D5CD,0	
AIBBM_5_bin.sst	Set of 5 binary broadcast messages
!AIBBM,1,1,7,0,8,06P0test1,0 !AIBBM,1,1,8,0,8,06P0test2,0 !AIBBM,1,1,9,0,8,06P0test3,0 !AIBBM,1,1,0,0,8,06P0test4,0 !AIBBM,1,1,1,0,8,06P0test5,0	
AIBBM_5_safety.sst	Set of 5 safety related broadcast messages
!AIBBM,1,1,6,0,14,D5CDi,0 !AIBBM,1,1,7,0,14,D5CDj,0 !AIBBM,1,1,8,0,14,D5CDk,0 !AIBBM,1,1,9,0,14,D5CDl,0 !AIBBM,1,1,0,0,14,D5CDm,0	
AIBBM_bin_stuffing.sst	Special message for bit stuffing test
!AIBBM,1,1,6,1,8,06Qv>khvOP,4	
AIBBM_multi_bin.sst	Long 5 slot binary broadcast message
!AIBBM,4,1,6,2,8,06P0456789012345678901234567890123456789,0 !AIBBM,4,2,6,2,8,0123456789012345678901234567890123456789,0 !AIBBM,4,3,6,2,8,0123456789012345678901234567890123456789,0 !AIBBM,4,4,6,2,8,012345678901234567890123456789012345678901,4	
AIBBM_multi_bin_long.sst	Longer than 5 slots binary broadcast message

!AIBBM,4,1,6,2,8,06P0456789012345678901234567890123456789,0 !AIBBM,4,2,6,2,8,0123456789012345678901234567890123456789,0 !AIBBM,4,3,6,2,8,0123456789012345678901234567890123456789,0 !AIBBM,4,4,6,2,8,01234567890123456789012345678901234567890123,0	
AIBBM_multi_bin_1.sst	Longer than 5 slots binary broadcast message, all bits 1
!AIBBM,4,1,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0 !AIBBM,4,2,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0 !AIBBM,4,3,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0 !AIBBM,4,4,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0	
AIBBM_ABM_17_5.sst	Set of 2 long messages 8 and 12 for message priority test
!AIBBM,4,1,6,2,8,06P0456789012345678901234567890123456789,0 !AIBBM,4,2,6,2,8,0123456789012345678901234567890123456789,0 !AIBBM,4,3,6,2,8,0123456789012345678901234567890123456789,0 !AIBBM,4,4,6,2,8,0123456789012345678901234567890123456789,0 !AIABM,4,1,2,000001005,1,12,0123456789012345678901234567890123456789,0 !AIABM,4,2,2,000001005,1,12,0123456789012345678901234567890123456789,0 !AIABM,4,3,2,000001005,1,12,0123456789012345678901234567890123456789,0 !AIABM,4,4,2,000001005,1,12,0123456789012345678901234567890123456789,0	
Dsi.sst	DSI sentence to check that DSI are not transmitted
$AIDSI,1,1,2210393930,,,,03,,11,,	
AIAIR_5.sst	Simple interrogation for msg 5
$AIAIR,000001005,5,,,,,,	
AIAIR_35_5.sst	Interrogation of msg 3 and 5 from ID1 and msg 5 from ID2
$AIAIR,000005002,3,,5,,000007001,5,,	

B.1.3 Regional operational settings (ACA)

Regional operational settings (ACA)	
File name	Description
Sentences	
AIACA_Region_in_ch86.SST	Region around standard position with test channels
$ECACA,2,5400.0,N,01030.0,E,5300.0,N,00930.0,E,4,2086,0,1086,0,0,1,,,	
AIACA_Region_out_ch74_76.SST	Region not including standard position with channels 74 and 76
$ECACA,2,5500.0,N,00900.0,E,5400.0,N,00800.0,E,4,0074,0,0076,0,0,1,,,	
AIACA_Region_17_3_SW.SST	2 adjacent regions in SW quadrant, for test 17.3
$ECACA,2,3000.00,S,01200.00,W,3100.00,S,01300.00,E,1,2081,0,1081,0,0,1,,, $ECACA,2,3000.00,S,01100.00,W,3100.00,S,01200.00,E,1,2082,0,1082,0,0,1,,,	
AIACA_8_Regions_17_7_1.SST	8 different regions to fill quickly the complete list, for test 17.7.1

$ECACA,,5400.00,N,01030.00,E,5300.00,N,00930.00,E,2,72,0,74,0,0,1,,, $ECACA,,5200.00,N,00700.00,E,5100.00,N,00600.00,E,2,2060,0,1060,0,0,1,,, $ECACA,,5200.00,N,00900.00,E,5100.00,N,00800.00,E,2,2061,0,1061,0,0,1,,, $ECACA,,5200.00,N,01100.00,E,5100.00,N,01000.00,E,2,2062,0,1062,0,0,1,,, $ECACA,,5200.00,N,01300.00,E,5100.00,N,01200.00,E,2,2063,0,1063,0,0,1,,, $ECACA,,5200.00,N,01500.00,E,5100.00,N,01400.00,E,2,2064,0,1064,0,0,1,,, $ECACA,,5100.00,N,00800.00,E,5000.00,N,00700.00,E,2,2065,0,1065,0,0,1,,, $ECACA,,5100.00,N,01000.00,E,5000.00,N,00900.00,E,2,2066,0,1066,0,0,1,,,	
AIACA_Region_17_7_2_c.SST	Region for test 17.7.2 c
$ECACA,2,5430.00,N,01200.00,E,5300.00,N,01100.00,E,4,2083,0,1083,0,0,1,,,	
AIACA_Region_17_7_2_f.SST	Region for test 17.7.2 f
$ECACA,2,5300.00,N,01320.00,E,5200.00,N,01200.00,E,4,2081,0,1081,0,0,1,,,	
AIACA_Region_17_7_4.SST	4 adjacent regions for test 17.7.2 f
$ECACA,2,5800.00,N,00800.00,E,5700.00,N,00700.00,E,4,2081,0,1081,0,0,1,,, $ECACA,2,5800.00,N,00900.00,E,5700.00,N,00800.00,E,4,2082,0,1082,0,0,1,,, $ECACA,2,5700.00,N,00800.00,E,5600.00,N,00700.00,E,4,2083,0,1083,0,0,1,,, $ECACA,2,5700.00,N,00900.00,E,5600.00,N,00800.00,E,4,2084,0,1084,0,0,1,,,	
AIACA_Region_lon180.SST	Special region at longitude = 180°
$ECACA,2,0100.00,N,17900.00,W,0100.00,S,17900.00,E,2,0074,0,0076,0,0,1,,,	
AIACA_Set_channel.SST	Set channel command, without area co-ordinates
$ECACA,,N,,W,,N,,W,2,2074,0,2076,0,0,1,,,,	
Request_ACA.SST	Request of ACA sentences from EUT
$ECAIQ,ACA	

B.1.4 Long range requests

The of long range requests include a MMSI number which is changed according to the actual MMSI number the EUT

Long Range (LRI, LRF)	
File name	Description
Sentences	
LRI_LRF_MMSI_all.sst	Request of all data addressed by MMSI
`$LRLRI,5,0,211003000,000002002,,,,,,,,` `$LRLRF,5,211003000,VTS,ABCEFIOPUW,`	
LRI_LRF_area_CEF.sst	Request of some data addressed by area
`$LRLRI,6,1,211003000,,6000.0,N,2000.0,E,4000.0,N,0500.0,E` `$LRLRF,6,211003000,VTS,CEF,`	
LRI_LRF_out_area_CEF.sst	Request of some data addressed by area, standard position not in area
`$LRLRI,6,1,211003000,,6000.0,N,1500.0,E,5500.0,N,0800.0,E` `$LRLRF,6,211003000,VTS,CEF,`	
LRI_LRF_area_at_180_CEF.sst	Request of some data addressed by area, area around longitude of 180° and latitude of 0°
`$LRLRI,6,1,211003000,,0500.0,N,17500.0,W,0500.0,S,17500.0,E` `$LRLRF,6,211003000,VTS,CEF,`	
LRF_ack_all.sst	For external confirmation of request
`$LRLRF,5,211003000,VTS,ABCEFIOPUW,`	

B.1.5 DSC sentences

The sentences are listed as they are applied to the DSC Testbox for transmission of DSC test calls. There is a special format used based on an earlier definition of NMEA private sentences.

The frame for transmitting a DSC call is:
`$PDEBT,CCDSC,T,00014600<call content>FF`

The <call content> has to be entered in Hex code, 2 hex numbers for each 7 bit DSC symbol, without spaces, beginning with the format specifiere which included only ones. The DSC coding and addition of redundance (3 bit symbol redundance and symbol repetition) are done by the test box. The content description of the calls is available on request.

The DSC sentences include MMSI number which is changed according to the actual MMSI number the EUT

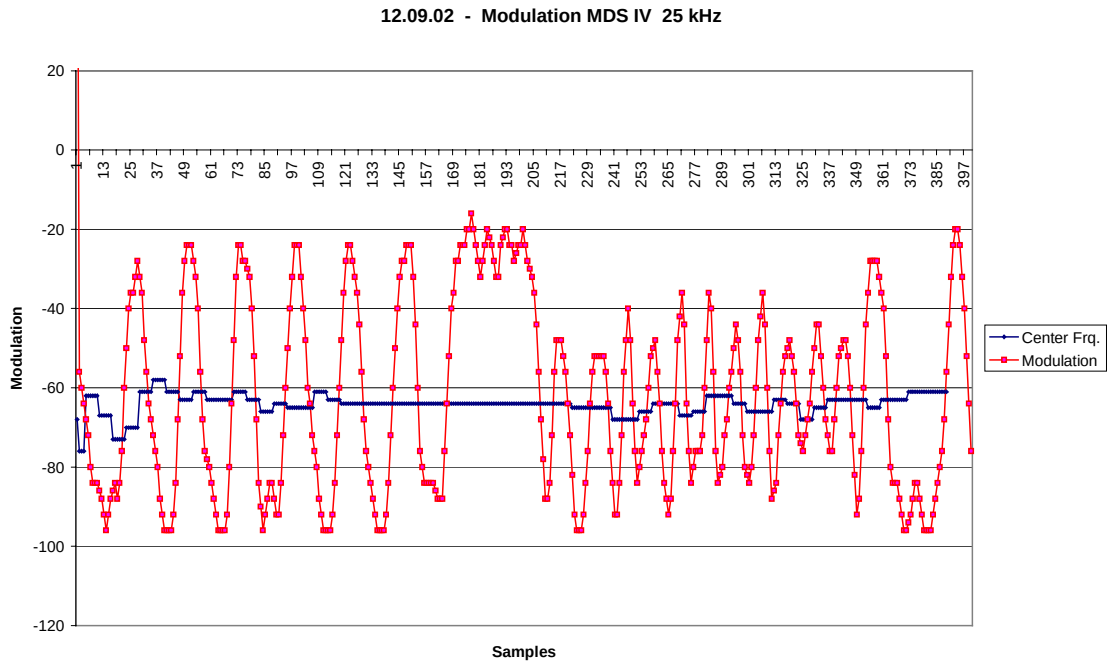
DSC Sentences	
File name	Description

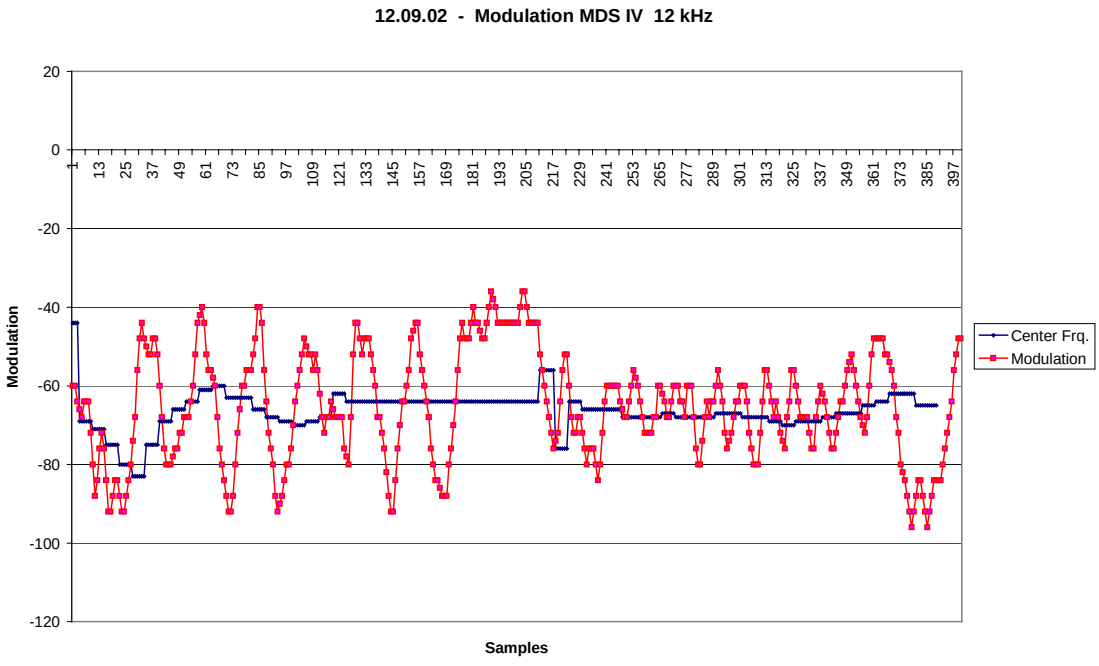
Sentences	
Test_Signal_1.sst	Standard test signal no 1, selective position and name request.
$PDEBT,CCDSC,T,000146007800000100506715 0A27271E676F75FF	
area_pos_name_rq.sst	Position and name request addressed to an area, standard position inside
$PDEBT,CCDSC,T,000146006705280000091E003C003C0067150A27271E676F75FF	
area_pos_name_rq_180.sst	Position and name request addressed to an area around a longitude of 180° and latitude of 0°.
$PDEBT,CCDSC,T,000146006700030001 4F1E003C003C0067150A27271E676F75FF	
sel_set_region.sst	Selective regional setting by DSC, standard pos. outside, channel 61
$PDEBT,CCDSC,T,000146007800000100506715 0A27271E68090A3D00680A143D00680C053C0001140068 0D053200010A0075FF	
sel_set_region_in.sst	Selective regional setting, standard position inside, channel 72, 73, 12.5 kHz
$PDEBT,CCDSC,T,000146007800000100506715 0A27271E680900480A680A00490A680C05280001030068 0D051E00005D0075FF	
sel_set_region_17_7_2.sst	Selective regional setting for test 17.7.2
$PDEBT,CCDSC,T,000146007800000100506715 0A27271E6809145200680A0A5200680C051E0001280068 0D051400011E0075FF	
sel_set_region_17_2.sst	2 regional settings for DSC test according to 17_2
$PDEBT,CCDSC,T,000146007800000100506715 0A27271E6809145200680A0A5200680C051E0001280068 0D051400011E0075FF $PDEBT,CCDSC,T,000146007800000100506715 0A27271E6809145100680A0A5100680C05140001280068 0D050A00011E0075FF	
sel_set_ais_channel_ch65.sst	Setting AIS channel to 65
$PDEBT,CCDSC,T,000146007800000100506715 0A27271E68090A4100680A14410075FF	
area_set_region.sst	Area addressed regional setting, standard position inside address, but not inside area, Ch 60
$PDEBT,CCDSC,T,000146006705280000091E003C003C0067150A27271E68090A3C00680A143C00680C05 1400005A00680D050A0000500075FF	
all_ship_set_region.sst	All ship call with regional setting
$PDEBT,CCDSC,T,000146007467150A27271E68090A3E00680A143E00680C05280001140068 0D051E0001 0A007FFF	
all_ship_set_channel.sst	All ship call setting DSC channel
$PDEBT,CCDSC,T,000146007467150A27271E65467FFF	

Annex C test diagrams

C.1 GMSK modulation 12.5 and 25 kHz bandwidth

see test clause 2.7

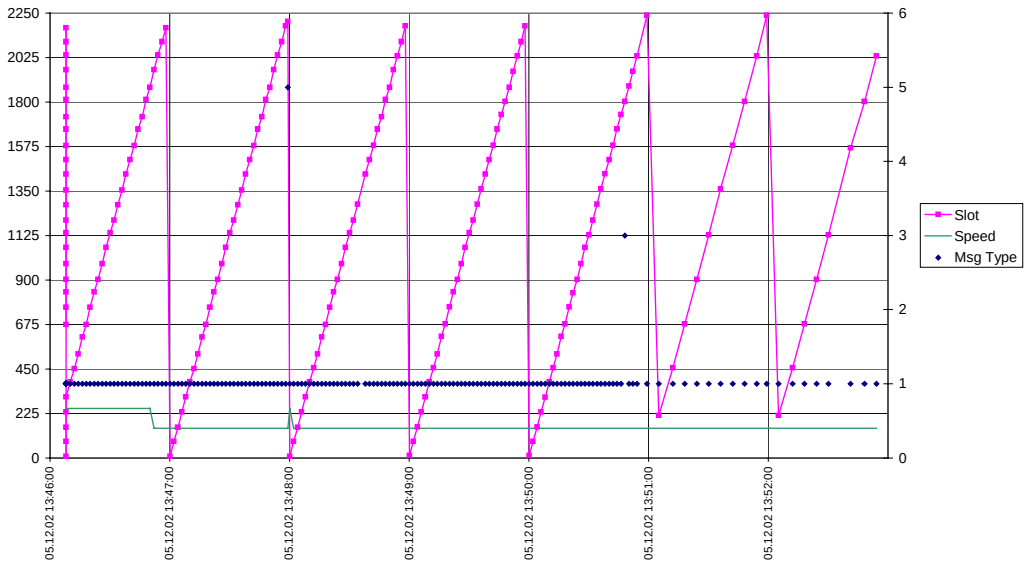




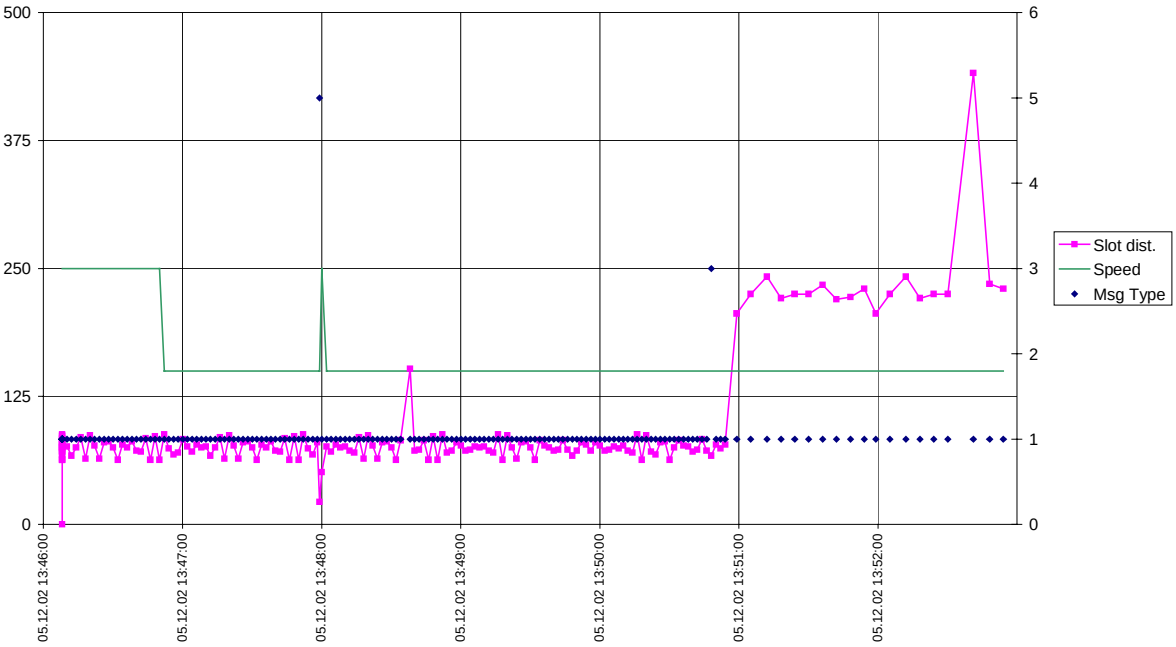
C.2 Reporting rate by speed

see test clause 2.4.1

05.12.02 - 14.4.1 - MDS AIMS MIV - Reporting rate by speed (25-->15kn) - Slots



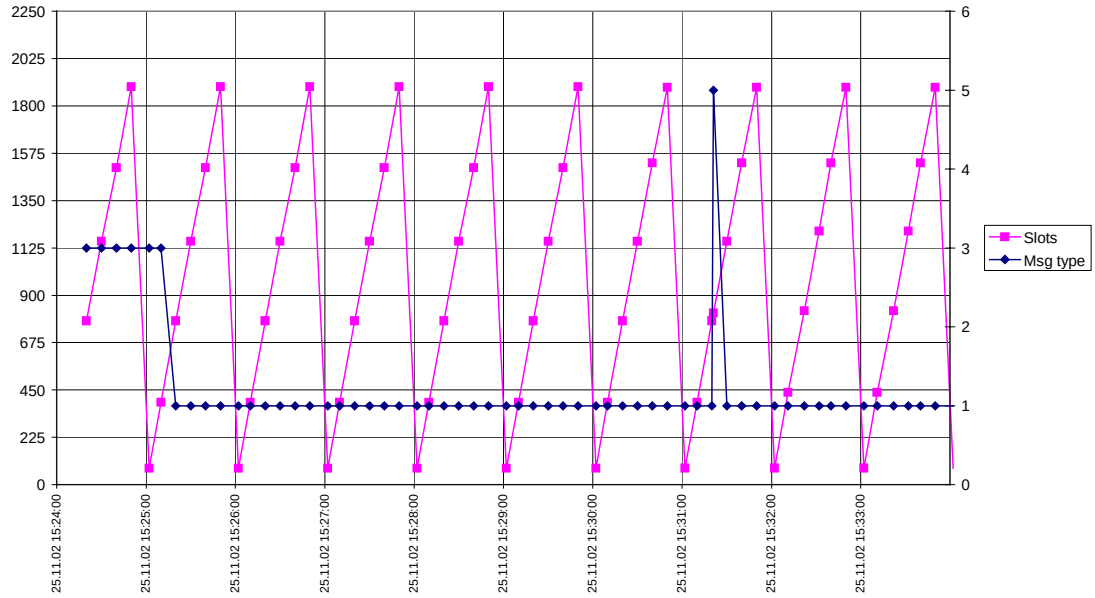
05.12.02 - 14.4.1 - MDS AIMS MIV - Reporting rate by speed (25-->15kn) - Slot offset



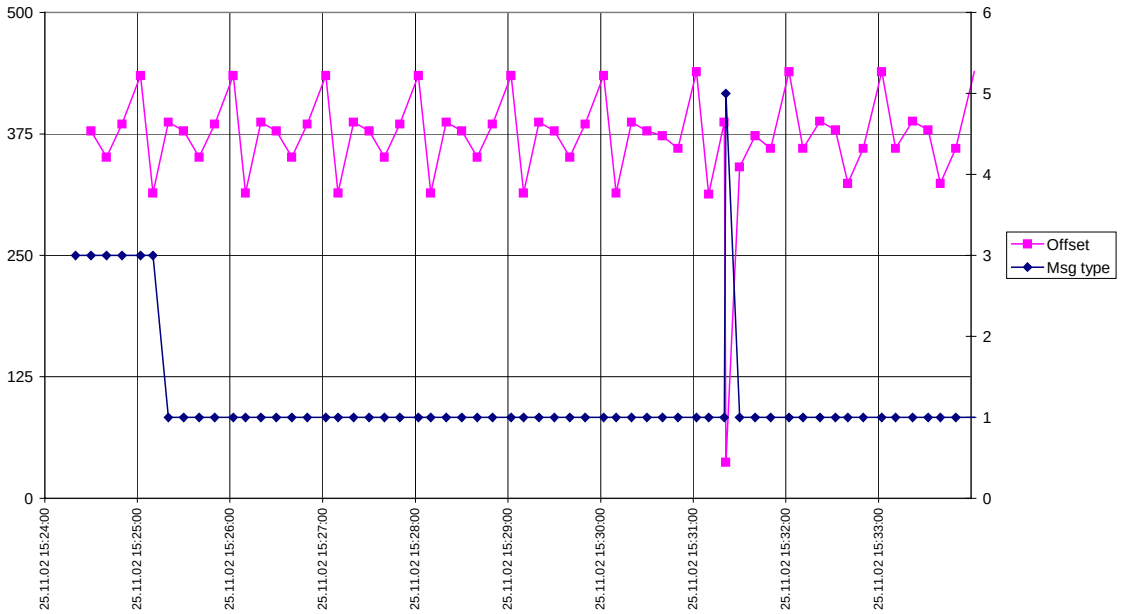
C.3 Network entry phase

see test clause 4.6.1

25.11.02 - MDS AIMS MIV - 16.6.1 - Slot allocation at Network entry

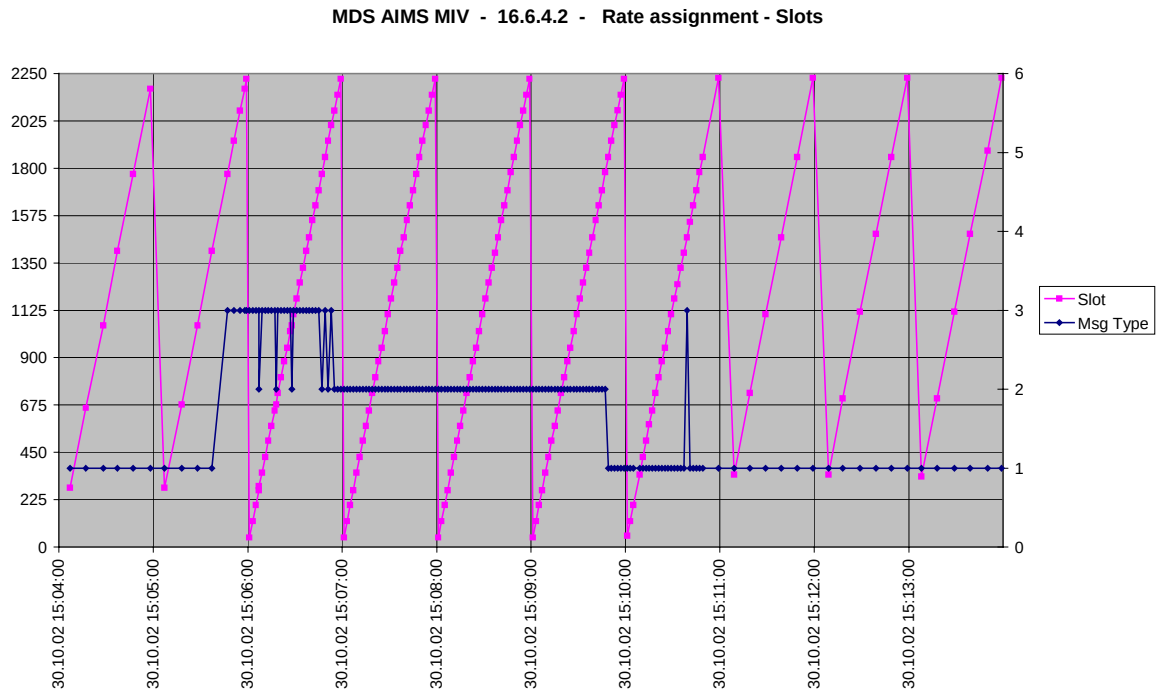


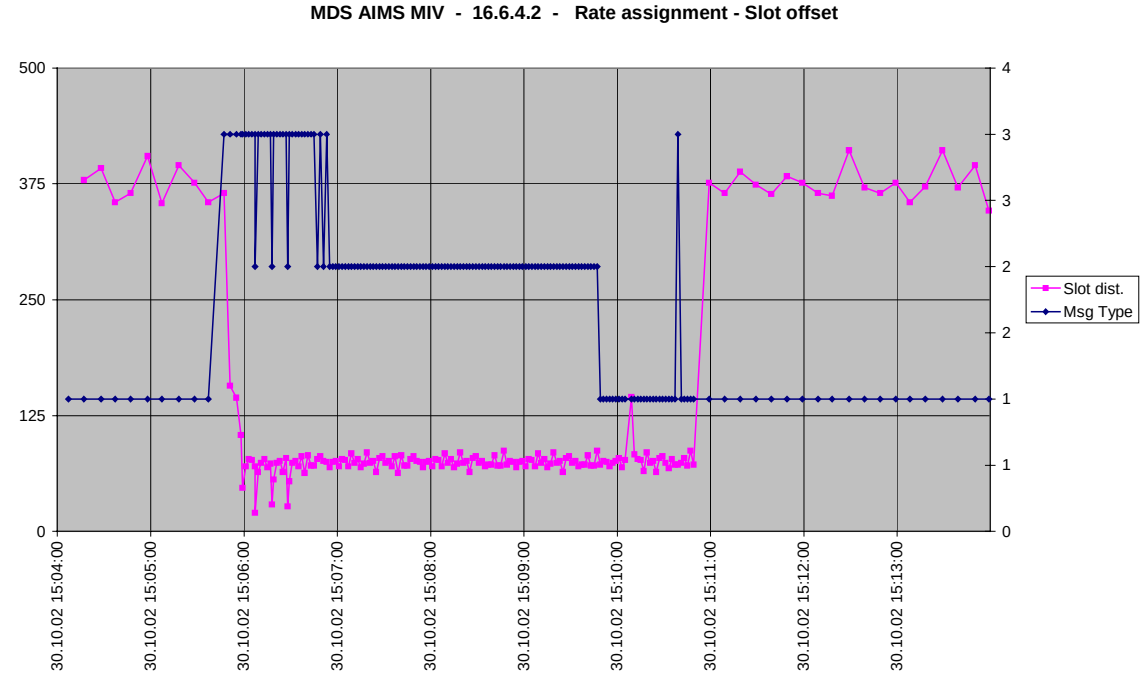
25.11.02 - MDS AIMS MIV - 16.6.1 - Slot offsets at Network entry



C.4 Assigned mode / report rate

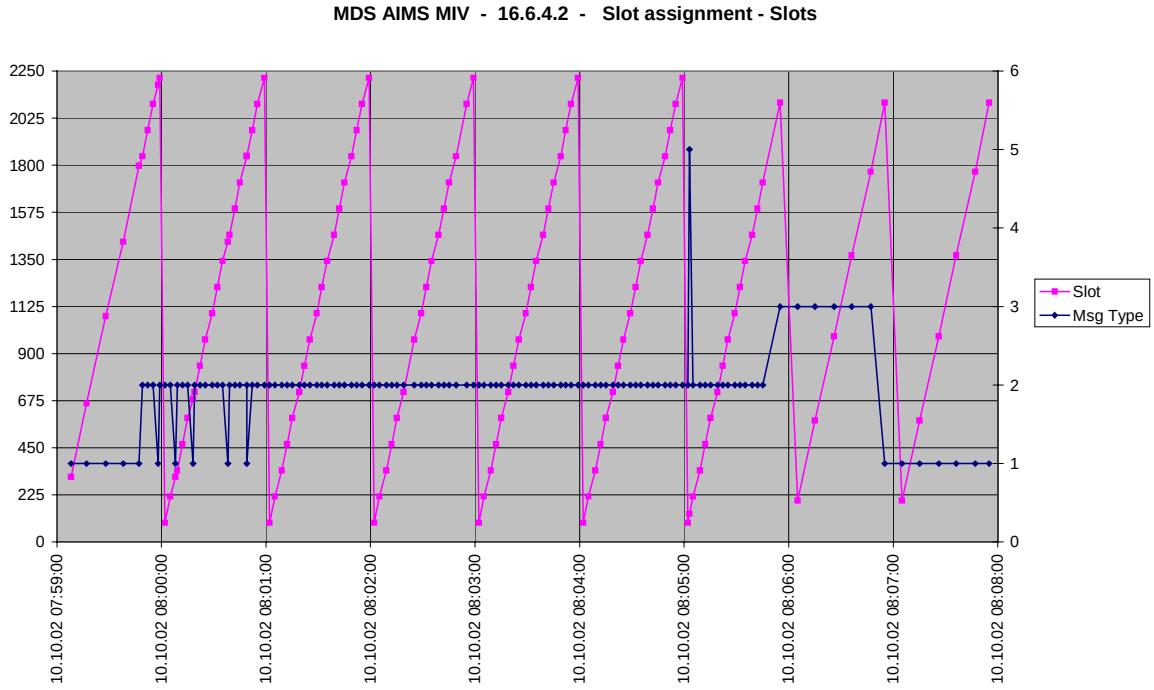
see test clause 4.6.4

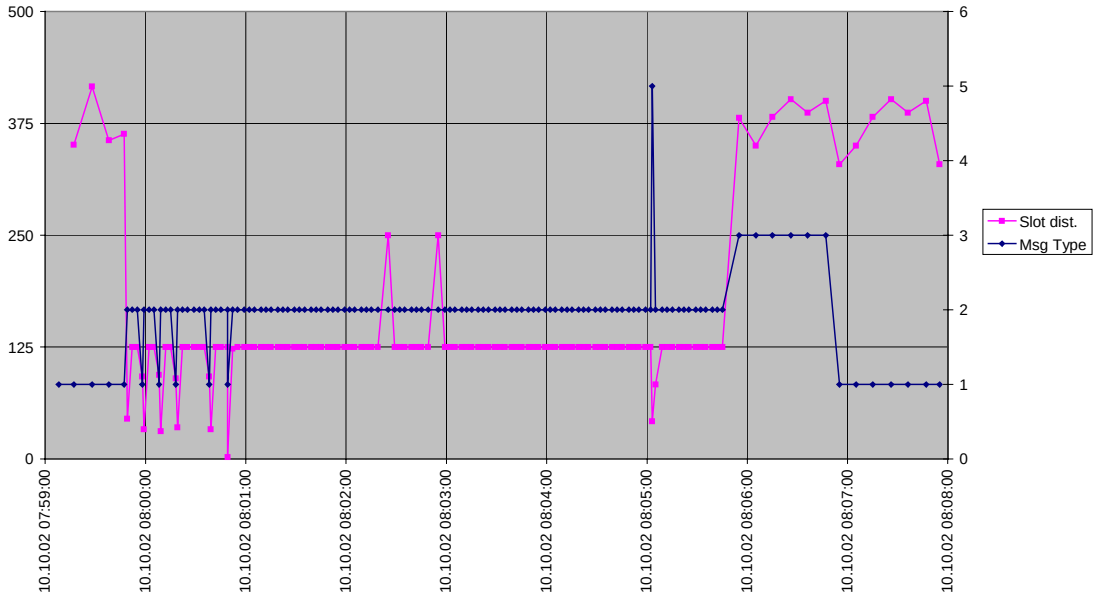




C.5 Assigned mode / slot assignment

(test clause 4.6.4 16.6.4 Assigned operation)

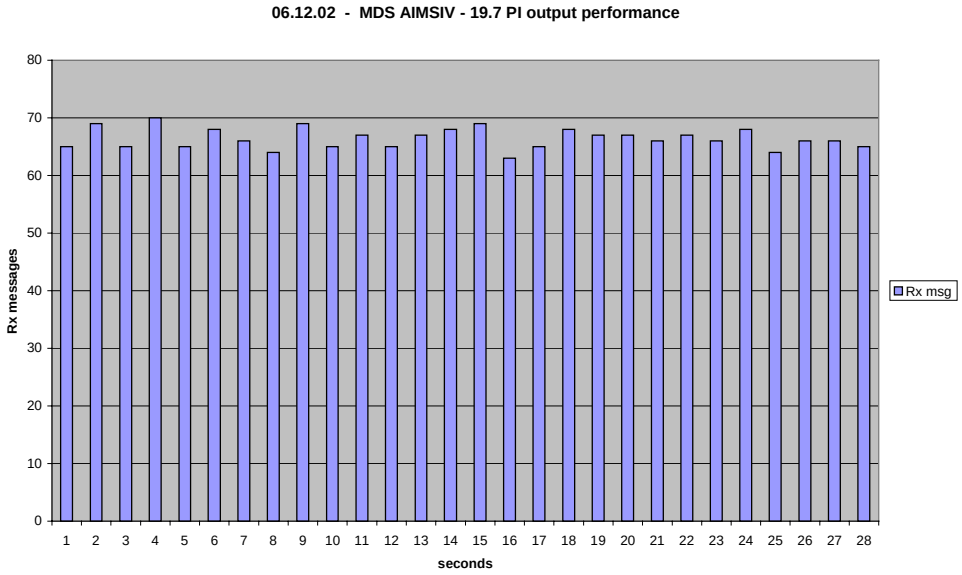




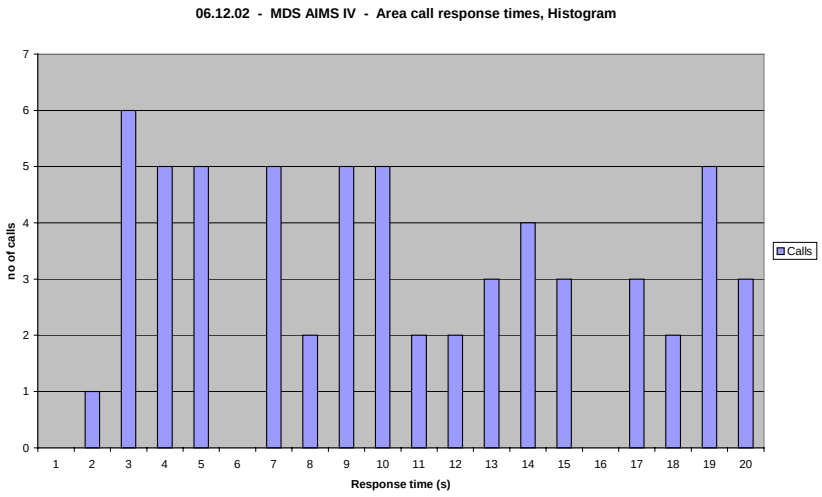
C.6 PI output under high channel load

see test clause 7.7

(67.5 msg/s is equivalent to 100% of messages at 90% load)

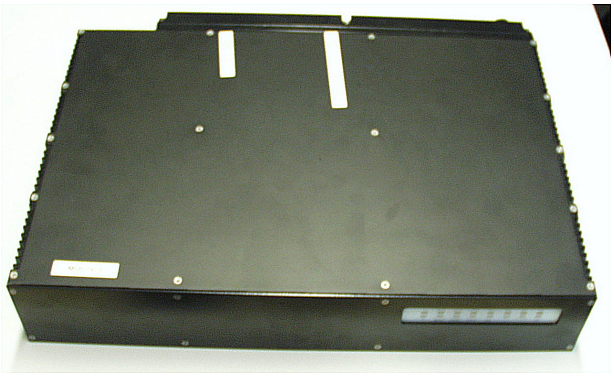


C.7 DSC response time

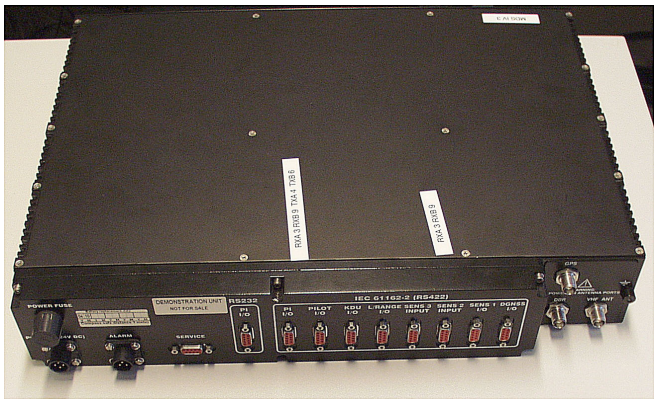


see test clause 8.4

Annex D Photos of equip m ent under test



Picture 1: Main unit, Front/top view



Picture 2: Main unit, Rear view / label

Picture 3: KDU, Front view

Picture 5: KDU, top view / label